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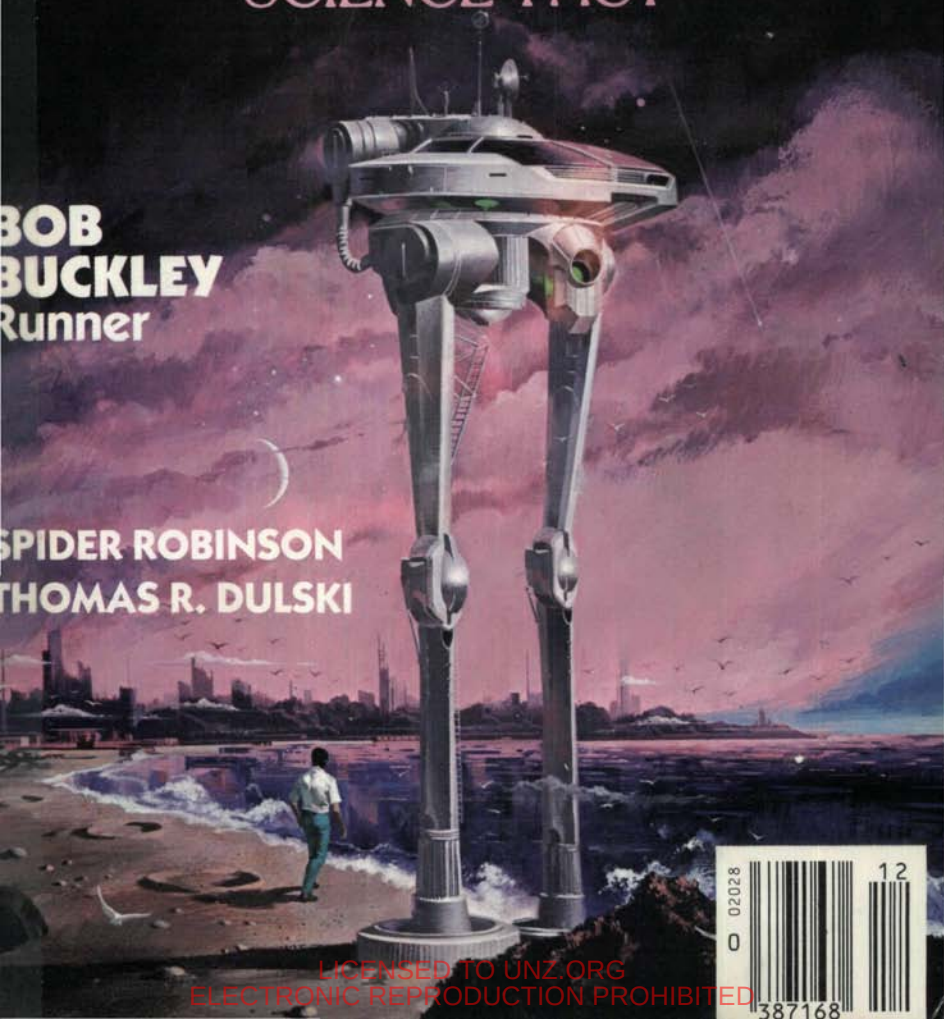

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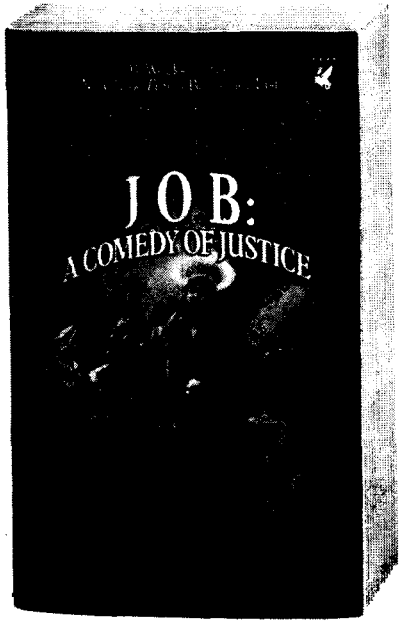

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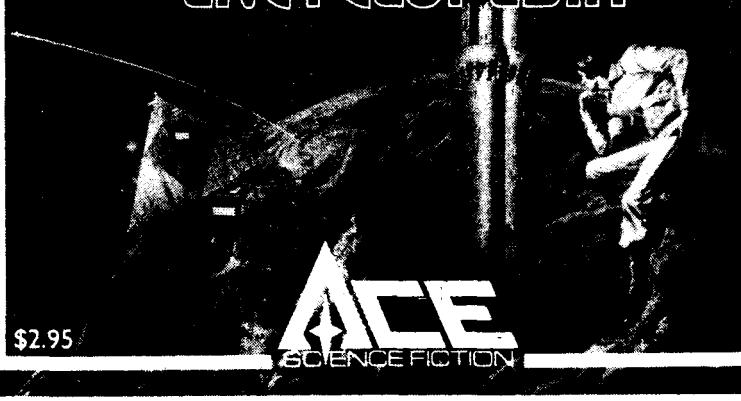

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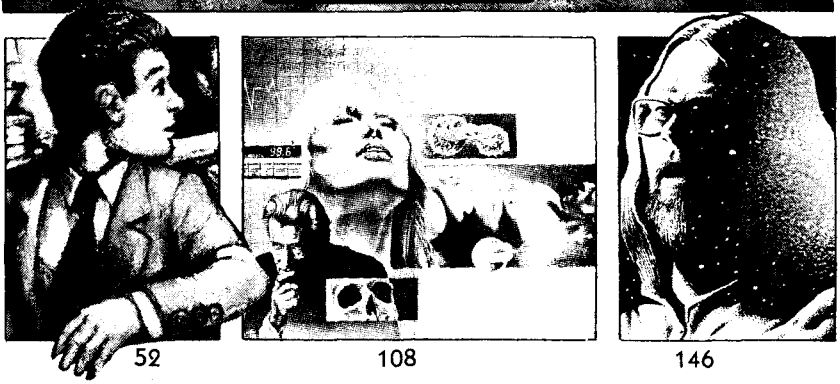

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Editorial

IN/DEDUCTION

Stanley Schmidt

Some years ago, when my sisters were in junior high school, they were subjected to an experiment in foreign language instruction. Instead of using a textbook and learning grammatical rules in a formal, analytical way, for the first several weeks of the course they were simply exposed to spoken Spanish throughout class periods and expected to respond in kind by imitation of what they heard. The theory, correct as far as it went, was that that's how young children learn their own native language. By being continually exposed to it, they learn to recognize and imitate words, meanings, grammatical patterns, and exceptions. Instead of being taught formal, general rules to be applied deductively to specific cases, as in traditional language courses, they formulate the rules for themselves, if only at a subconscious level, by inductive reasoning from a host of examples.

The curriculum planners' reasoning, evidently, was that since that method is the one people use to learn the language they know best, it should also work best for learning additional languages. In this case it didn't work very well at all—perhaps because they overlooked a few little details about how babies learn. For example, they're exposed to the language all day, every day, for several years; and they're *very* highly motivated because they quickly learn that that language is by far the most effective tool at their disposal for getting things they want from other people. English-speaking seventh graders, on the other hand, are exposed to Spanish for no more than a few widely scattered hours per week, and they have much less motivation to learn Spanish because they already *have* a language which is far more useful for getting anything they want in everyday life. Quite probably they also find it frustrating to try to learn a new language without using *all* the skills and senses they have which could contribute to the effort,

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such as reading—a problem babies don't have.

Nevertheless, controversies over inductive versus deductive approaches to teaching large, complicated bodies of knowledge continue. Languages are just one example. Similar problems arise in the sciences. Electromagnetic field theory, for instance—whereas language teaching has traditionally used a primarily deductive approach. E&M as taught to physics majors has more often used a largely inductive development. The student usually starts by being told about experiments indicating that charges exert mutual forces described by Coulomb's law, others leading to the Biot-Savart law for magnetism, and so forth. Each of these specialized rules can be applied deductively to the solution of a special class of problems, but the big thrust of the course is to show that *all* of the essential content can be distilled into four short equations: Maxwell's equations. Once you have Maxwell's equations, you can quickly derive any of the specialized results which led to them, and doing precisely that can make an impressive finale to a "traditional" E&M course.

In grad school I helped teach a course which turned that procedure around: it *started* by *postulating* Maxwell's equations and then deducing everything else from them. That approach looked truly elegant, and the author of the book using it is a truly outstanding physicist—but in the cases I saw, the experiment was no more successful than my sisters' Spanish course. The problem, I think, was that Maxwell's equations contain so much information, in such a highly abstract form, that most of the students starting there had little or no mental picture of what the symbols they were manipulating *meant*. As a result, they meant very little. Most of us, I think, need to gradually build up a physical picture of what electric and magnetic fields *are* before we can get much out of vector calculus equations describing their interrelationships.

Historically, our species had gained most of its basic scientific knowledge in an essentially inductive way—and I'd guess that's true of any other scientifically inclined species. You can't formulate the principles governing astronomy or chemistry or electrodynamics or chromodynamics until you've looked at enough examples of *what happens* to see what patterns exist. Once you've recognized the patterns, you can attempt to describe them—but you have to see them first. If you succeed in formulating a good enough mathematical description, you can then use it to predict, deductively, what will happen in cases you haven't looked at yet. Sometimes that will succeed (meaning the predictions will be experimentally verifiable) because the new cases are similar enough to the old that the description you've formulated is applicable; such cases tend to be called "engineering" rather than science. An example would be the design of a new bridge to carry a specified volume of traffic across a particular river. Sometimes the attempt to deduce what will happen in a new case falls flat on its face—because the new case, for reasons you couldn't fore-

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see, doesn't belong to the class accurately described by the old principle. An example of that would be attempting to predict the acceleration produced by a given force on a particle already moving at 0.99c by using Newtonian mechanics. The prediction would not match the experimental result because Newtonian mechanics don't work at that high a speed. If the experiment were done at the right point in history, it might force the recognition of a new pattern (Einsteinian mechanics) containing the old (Newtonian) as one part. That sort of process is the essence of scientific, as opposed to technological, process: you can't discover a new principle until you see where an old one fails. Deduction is an important part of science, but it is only appropriate rather late in the development of a field. Trying to force it into action too soon will result in the formulation of very incomplete patterns. Scientists being human, that may

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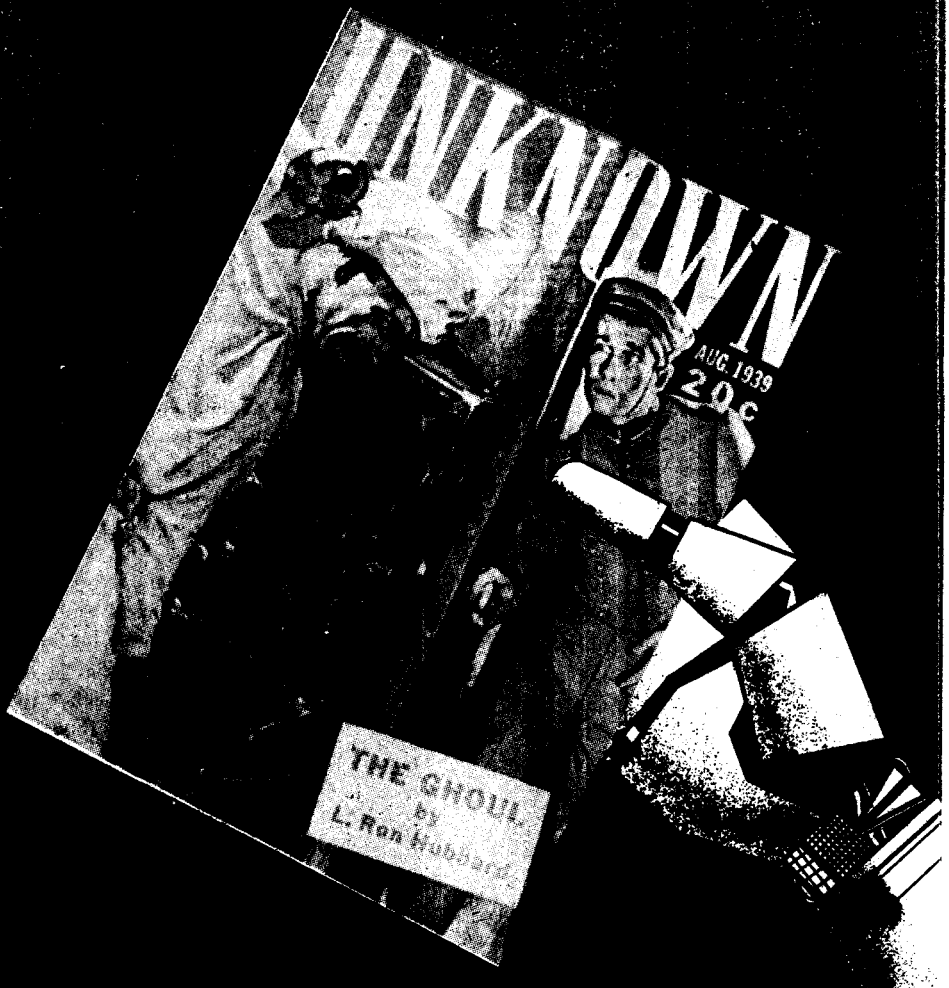

SCIENCE FICTION

MICROBOOKS

(See page 111)

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actually impede the development of *good* science by preventing the recognition of *complete* patterns. So a good scientist must always be open to the possibility that he has not yet *seen* the complete pattern.

That's a large and important subject in itself, to which I shall likely return some day. For now, though, my concern with inductive and deductive reasoning is primarily in the area of education. As knowledge proliferates, and people are needed to work with it, it becomes more and more important to learn the most effective and efficient ways of passing it on. It seems to me that for a student learning an already formulated body of information, as well as for a civilization developing a new body, both inductive and deductive elements are necessary —and it is no less necessary to recognize which is appropriate when. It is also necessary to recognize that there are important differences between a student's learning established science (a phrase I don't like, when I think about it) and a civilization's learning new science, even as there are important differences between a baby's learning a first language and a teenager's learning a second. At another point in my graduate assistantship I encountered a professor wanting to run an introductory lab by turning a bunch of students loose with a bunch of equipment, without instruction or supervision, to let them make discoveries for themselves. It sounds nice, but (as a fellow graduate assistant observed), "Man had glass for an awfully long time before he learned to make telescopes."

In the last analysis it may be, as with so much in education, that the nominal form of a method is less important than who's applying it. I recently took a weekend immersion course in Polish, a language with which I had only a very limited previous acquaintance, superficially resembling the one my sisters took but, I think, considerably more effective. Why? Partly, I think, because of the sheer intensity of the experience—for a couple of days the class did devote itself to, and depend on, the target language almost as completely as a baby does (though it also made some use of the written word). But a lot of what success this course enjoyed rested on the fact that these students were there because they *wanted* to learn the language, and the professor in charge had become interested in this method and devoted several years to learning how to make it work.

Personally, I had two main reasons for taking the course: the desire to learn aspects of the language I couldn't get from a book (specifically, real-time conversational practice), and curiosity about how well the "immersion" method worked. My impressions were, on the whole, favorable: it *can* work, if delivered in sufficiently concentrated doses by people who know how to use it effectively. A weekend is not enough to establish real fluency, of course, but by extrapolation I can easily believe that a few weeks of such bombardment could go a long way in that direction. And I can certainly recommend such a course as a highly interesting and enlightening experience.

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However, after some time for reflection since the course, I find myself even more convinced that the *most* effective way to learn a language or any comparable system of knowledge is likely to involve large doses of *both* induction and deduction. I'm not sure it always matters which you start with. You need both, and either will be easier if you already have some of the other—and harder if you don't. The relative *amounts* of each that work best may differ considerably among individuals. I personally find it easiest to learn a new musical instrument with the help of a good book; but I have a good friend who made very little progress that way but became rather fluent on the recorder when a rainy spell on a backpacking trip stranded him in a tent with one (but without a book) for several days. In my Polish weekend, I could see inductive learning at work—for example, there are certain sounds which can be spelled either of two ways, and I found myself increasingly able to guess which one would be used in a new word, even though I couldn't say why. But I think the fact that I had previously worked through part of a textbook made the conversational weekend in some respects easier for me than it would have been without that background.

Yet I also find, on returning to the textbook after the conversational course, that having been exposed to a lot of vocabulary that one weekend is making the *later* lessons in the book easier than I would have expected, because I have now seen and recognized so much of what the book discusses analytically. The book, in short, is now *explaining* patterns which I have already *experienced*. It is making explicit order which I have already recognized, but not clearly enough to describe accurately for myself.

Which may sound familiar, because that's also a large and important part of what science attempts to do.

Somehow I am reminded of a friend of mine with a rare distinction: he is a highly successful writer, whom I admired as such long before I met him, and he has a college degree in creative writing. Since, in my experience, these things seldom go together (an observation worth pondering!), I once asked him whether he thought his literary success had come as a result of, or in spite of, his formal training. "Neither," he replied. "It's not that simple. . . ." He went on to explain that while his teachers, unlike those in many academic writing programs, had included several very well known and highly successful professional writers, the only one from whom he had really gained much was the one he had as a senior. Not because the others had had less worthwhile things to say, but because my friend (whose name you would recognize instantly) had begun his own professional writing career concurrently with his college education. By the time he was a senior he had enough of his own, real-world experience that his teacher's words helped make sense of things he had already lived through—while before that, they were just words. ■

● Liberty means responsibility. That is why most men dread it. George Bernard Shaw

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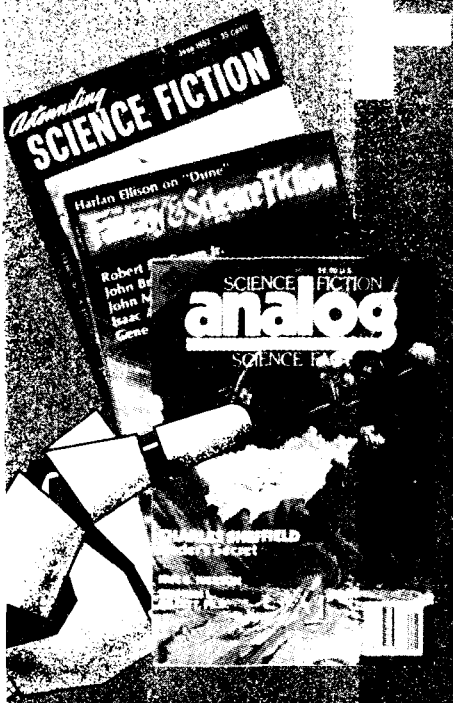

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RUN

Bob Buckley

Civilizations, like individuals, come and go, but Man is hard to kill. But don't bet too much on your

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NER

Nicholas Jainschigg

descendants
seeing
things the same
way you do. . . .

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Lorny Platz had a problem—

—no, several, actually.

He had zeroed out on credit; the Weavers were going to eject him from what they liked to describe as their benevolent protection, for non-shipment of certain goods—tantamount to an execution; and Boss Chetterman was getting impatient, mostly because that same long-overdue shipment was owed to his mob uptown. Now, when you considered the facts, Lorny had good reason for being a bit tardy with his delivery schedule. After all, his feet had thrown a slide-pedal piston assembly and totaled out messily against the Battery tunnel buttment. Clunky though it was, and old, its walking frame patched in more places than it was possible for Lorny to count, he had been fond of the wreck. Now it was junk, totaled, irreparable scrap metal; and to top all that, he had a sponger. Spongers were bad news in the best of times. But this one was a pasty-faced, flab-chubby madman hanging around his hut claiming he was from the past, agitating Lorny about finding some people, a bunch supposedly from that same past.

And the killer storms of winter just a few short weeks distant. Lorny slammed his fist hard against the side of his shelter. The antique glass starred and broke.

There was no way out of it, not if he wanted to keep on breathing. He had to make that delivery and Lorny hated to walk. That was what feet were for, walkin'. Well, as he had read once from a scrap of book, drastic times required drastic actions.

It was time to see the Cruiser.

Lorny checked the charge in his tickler, his weasel-face grimacing nastily when he saw it was exhausted. That negotiating tussel with the Weaver contract-priest had drained his last sting. Damned stubborn fanatic. It was okay for some people to starve if it was their religion, but Lorny liked that tight feeling in his belly. A good meal had never ruined anyone's morals, as far as he knew. He pried the back off the tube and deftly crossed two wires, effectively bypassing the auto-cutoff device. Now, if he were to squeeze the power button, the power pac would go into total surge. But he'd have to remember to fire quick and drop, though, or he'd lose a hand. He grinned—or be just like Stub at the Night Fever, the only party spot that still let Lorny in for a night's high flight on credit. Old Stub always had been the slow one.

The Cruiser had his barter lot on the surface, up by a stand of old Yellowwoods left from the Good Times. There were even some lumps of archaic concrete scattered about the perimeter, blobs of red rust exploding from within. The Cruiser said they was ancient benches from an old park, but the Cruiser was always lyin, and Lorny didn't believe a word of it. Them concrete things had always been there, 'cause everybody knew the world was made just like it was now, with the Good Times put into their heads to make them feel guilty and be good, just like the Preacher People wanted.

Lorny locked up the shelter, made sure the pasty man was chained securely, and set off, scuffling noisily through deep mounds of brown leaves littering the path up out of the old underground. It was only a couple of klicks to the Cruiser's place. The flat-

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topped hill was in deep forest, hidden, though now that was mostly unnecessary since feet lots were considered sanctuary; nobody messed about in there. If they did, bad "accidents" usually prevented a repeat of the incident. That was law.

The sun was hot on Lorny as he moved along at a wary pace. Once a killer bird squalled and he froze on tiptoe. But it had made a kill, judging from the loud thrashing that followed, and after a calculated pause to make sure its mate wasn't anywhere near, Lorny went on.

Then he saw a glinting through the trees, high up, bright metal being washed by the sun. It winked down at him temptingly. Curiously fascinated, he hurried forward. Then stopped breathlessly as the trees fell away and revealed a vision.

Lordy, but she was a beautiful machine: twenty feet tall, all shiny aluminum and chrome joints, with the control head standing up high and proud. And hardly a dent on her. Somebody had lovingly buffed the scab-colored army paint off her exoskeleton and shined the armo-glass till it gleamed like water sheeting off a mossy rock.

He tip-toed careful into the lot, mindful of booby things, and other such tiny killers people liked to leave lying around to be safe. The expanse of pounded clay was crowded. There was a lot of stock, new stuff. Lorny smiled, his yellowed, chisel teeth making a rare appearance behind thin lips. This was good. He was almost feeling like a runner again.

The Cruiser was overhauling a heavy freight job, seating a new 500 HP Torque Master in the cavernous body cavity as Lorny strolled friendly-like into the greasy, shadow-draped cave that served the dark giant as a shop.

"Lo, Kid. You shoppin' or eyeballin'?" The Cruiser didn't mess with eyeballers, he was a businessman. He paused in his labors, a carefully maintained spanner raised halfway from a workpiece. "Heard about yer runner. Tough break. Yu know I buy scrap, huh?"

"Oh, I'm fix'en her," Lorny lied. "Some bent pieces here and there, couple burned out motors. She's not that bad, just looks like hell."

A ghost of a smile flickered across the sweat-gleamed muscles of the Cruiser's chocolate-brown face. "Yeah," he said soft. "That's what I heard."

"I think I need a second pair of feet, though, Cruiser. Times are busy, trade is fast. A man needs to be able to move in time with the business, you know how I mean that?"

"Sure, Kid. Sure." The big man wiped his hands on a bit of rag-scrap. "See anything on the lot that looks interesting to yu?"

"Well, I don't know. Pretty bare out there. I need something that works, understand. Fast, dependable. Not scrap; already got one feet to fix." Lorny laughed derisively, slyly watching the Cruiser's face. Sure enough, a twitch of irritation convulsed that big tendon lying next to the massive jaw bone. Score one for Lorny.

"All my feet work, kid. Some people lik'em rough on the outside; keeps theft down if your feet look like they's about to throw a piston. It's fer yur own pro-

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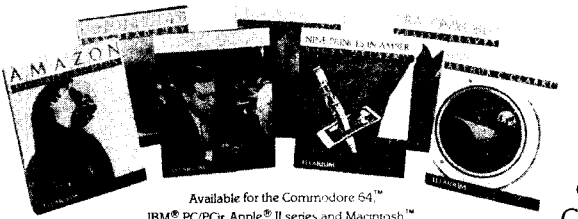

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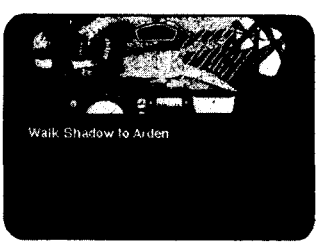

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tection I make 'em like that." He threw a quick hand at the shiny machine near the center of the lot, the one that had caught Lorny's eyes from the first; the same that he had judiciously ignored since gaining the Cruiser's attention. "Yu wouldn't want a feet like that one where you hang out, it'd be hot-wired and gone in noth'in flat. That's a glamor boy's transportation, nuth'in yu need."

Lorny put his fist under his chin, cocked his head thoughtfully and rubbed his thumb against his lower lip. "She is a pretty garish bit of work, right enough. Hairy armament, too. Heavy lasers, looks like. Where'd you get it?"

"Some Souther brought it by last month, he was on a skip; 'magine the feet's hot." The Cruiser planted big hands on grease-stained hips and chuckled, the laughter sounding like it was bubbling up from the bottom of a deep well. "Bought it deadlands cheap. Bad haggler, the Souther was. Heard someone cashed him in not long after; Chetterman's boys. Hates those that don't deliver, don't yu know?"

Lorny grinned weakly, and nodded. "How's about that delivery unit by the fuel casing?"

The Cruiser became serious. "Excellent choice. Not fast like that chrome job, but dependable. Could carry a lot of freight: rated fer two ton. National Guard piece. Had it in stock fer a while," he gave Lorny a fatherly wink, "I could let it go fer maybe a grand."

Lorny thrust his hands deeply into his pockets, showing disappointment. "Too much for me, Cruiser. Maybe that hopper there by the fence?"

The Cruiser shook his head sadly: "Split motor housing. I'd sell it to anyone but yu, kid. Only take yu a mile or so before it blew out and stopped. Won't sell yu that one. Can't get the parts I need to fix it."

"Well, if I was to scrape together some loose cash, maybe hock a wire, I might be able to give you seven hundred for the hauler."

The Cruiser intensified his hang-dog gaze. "Couldn't really take less than nine-fifty fer it. Cost me some to repair. I put first quality rebuilds into the gear boxes and power units."

Lorny started walking away.

"Nine, maybe," the Cruiser threw out hastily.

Lorny kept walking, but muttered "Eight-seventy-five," over his shoulder.

"I'll charge it up fer yu." The Cruiser said, looking glum.

"Well, then that's a deal." Lorny's stroll had taken him to the foot pads of the gleaming twenty-foot giant and now he leaned backwards, gazing longingly up at the control head. "Think maybe I could see that interior of this gee gaw while you do that?"

"Here's the access keys," the Cruiser said, and tossed a sparkling bit of metal over. "Don't try to start it, though. I've got the gyros out fer re-jeweling."

Lorny caught the keys easily, and scrambled hand-over-hand up the access ladder looking like a scruffy monkey, dirty watch cap tilted precariously on the back of his head. The canopy lid released and a puff of stale, over-heated air welled from the interior. Lorny's eyes darted across the panels as he made a quick inventory. Two seats, power up, gyros still in place—the Cruiser had lied. Perfect.

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He slid inside. Ignition was by tumblers. He felt the keypads, letting his fingertips get to know the surface of the plastic. Slick spots there and there, so much for the numbers, but what pattern? He tried 7,7,8,9.

Wrong guess. A panel screen told him coldly that he was invalid and warned that three bad tries would freeze him out.

He grinned through tense lips and touched 9,8,7,7. A beeper chirped its growing displeasure, and the same stubborn panel warned him that he had but one more try left.

"Hey Kid, what yu do'in up there. Yu want yer hauler, or not?" The Cruiser was getting impatient. Another minute and he'd be coming up the ladder.

Lorny had a sudden inspiration and touched 7,8,9,7. A low hum of power released filled the control head. Relief welled. He was in!

"Cruiser," Lorny hung his head out of the canopy and shouted. "I need fast feet. Keep an account. I'll be back with cash if the Chetterman don't kill me. We'll settle up then, yer price, no haggling."

Lorny slammed the canopy and put the feet into gear. It stepped out fast and nimble, easily vaulting the high security fence and darting with consummate grace between the towering Yellow woods as terrain monitoring microprocessors cut in. Through the rear view panel he could see the Cruiser standing like a massive ebony thundercloud, arms folded across his massive chest. He was shaking his head sadly. Sad for himself, or sad for Lorny, the little runner wondered briefly. And then put all his attention to learning the controls of his new toy.

The man from the past was squatting happily in front of Lorny's shelter scorching a dead killerchick over a garbage fire. Broken chains still dangled from his wrists and ankles. Lorny shook his head in squeamish disbelief as he brought the feet to a halt and popped the canopy. What the hell was wrong with pre-packaged food? This Anders character might as well be from the past, he was crazy enough to have come from anyplace but here and now.

The pasty face looked up in horror, seeing the feet for the first time. Damn, Lorny realized. He was going to run away.

"Hey, it's me," Lorny shouted down. "Yu still want to find yer people, don't yu?" Double damn. The Cruiser's muttonhead talk was rubbing off.

Anders's mouth grew wide in recognition.

"That's right, it's me up here. Drop that thing you're burning up in the fire and fetch that blue metal box from under the plate in the shelter floor. It's the one I showed to you last night under the food cases. Bring it on up. We're leav'in."

The man from the past was smart, even if he was as clumsy and defenseless as a new-born. In a moment he reappeared, box under one arm, the still-smoking hunk of bird in the other, and vaulted the ladder.

"Give that to me." Lorny seized the box and stowed it behind the seats. He had to toss out several cases of field equipment in the process. That hurt. But

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the delivery was more important. Then Anders crawled inside with his bird.

Lorny gazed at the scorched and steaming carcass with disgust. "You're not going to eat that, are you?"

"It's a whole lot better than that flavored cardboard you've been stuffing me with. This, at least, is real food."

"Just don't make me watch, okay?" Lorny pulled down the canopy and sent the feet pounding through the main tunnel. It stalked quickly through darkened subground chambers littered with heaps of long-forgotten debris, ducking conduits sometimes, heading North toward the area he had keyed in on the finder panel. Why had the Souther given up this prize? It was puzzling, but Lorny wasn't going to let it bother him enough to give it back.

Beside him, in the second bucket, Anders contentedly chewed on the browned leg of the killer chick. The smell of cooked flesh had permeated the control area despite loudly whirring ventilators. Suddenly Lorny's stomach growled uncontrollably.

Anders laughed, shreds of bird meat flopping in the corners of his mouth. "I knew you couldn't resist." He ripped the gutted carcass in half and held a chunk over. "Go on, try it."

The disgusting thing hit him on the hand and Lorny licked at his soiled and greasy skin, grunted, then licked again, this time in earnest. Soon he was gnawing just as vigorously at the fowl as Anders.

"Throwback," the man from the past mumbled, grinning around his meal.

Lorny didn't answer. He was busy.

* * *

The walker unit hammered on into deepening darkness.

The underground was always dark now.

Lorny touched a control on a panel.

Big arc spots on the control head poured a harsh glare into the darkness and prompted glassy reflections from twisted and ruined shapes of metal. The Cruiser had told him that they had once moved on wheels along the paired rails that in some places still showed. It seemed difficult to believe, but the fact was that wrecks heaped the interior of all these unused transport tunnels. The Preacher People—the only ones who bothered with education and books now—said that the rail magic had gone suddenly, freezing everything in place. More graphically, the heaped piles of bleached bones told of the mobs who had tried to fight their way up to freedom, and had died as hell's fire had exploded down the entries, cooking them instantly.

Anders had been quiet a long time. "Who's this Chetterman?" he asked suddenly.

"Big Boss of the Uptown. Lives on the surface, like the Cruiser, shows how important he is. His muscle keeps Manhattin the big center for trade that it is. He's the law."

"How come he's the namesake of a cheese?"

Lorny shook his head. "Don't know anything about cheese. That something out of your past?"

"Yeah, maybe. Forget I said anything about it." Anders turned and rooted about behind the seats. "What's in this all-important box you're delivering?"

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"Keep your fingers out of it. Breakables. The Weavers want Chetterman to have it. Maybe he'll keep out of their shafts when he gets it, they think. His muscle's been prowling 'round recently, sniff'in out junk." Lorny chuckled.

"And you think he won't?" The pudgy face wore an intent expression.

Sharp, this guy from out of time, Lorny thought. Could be too smart? "Chetterman likes the prime turf. It's his stock in trade. Anything worth having, he wants. Now the Weavers live down south in wasted swamps, eatin' scum, least that's what Manhattin thinks. The box proves different." Lorny laughed again. "Won't be the first time some fast head screwed himself trying to think his way out of a jam. Myself, got no love to share with Weavers, not when their benevolency rates so high. And maybe Chetterman won't bite me so deep if he knows he's got friends in the territory."

"Sounds like a risky game to me. Easy to get burned."

Lorny didn't bother to answer. He had a scheme in mind that involved this buffoon from the past. No use letting on now what he had brought Anders along for. Not yet. Up ahead, a section of tunnel roof had fallen in and now a broad shaft of sunlight poured down onto the floor, yellow-misty with dust and mold spores. A killer face was digging through a tangle of weeds on the low hillock of rubble directly below the gap, hunting monkey rats. It would search carefully for a bit, cocking its big-eyed head from side to side, then pause to rip through the debris with vicious talons. Then it heard the walker step-stepp'in along and looked up, its four foot long razor-sided beak opening expectantly.

Lorny grinned and scorched its tail with a light touch of laser light. The hunter bird screamed and fled into a side tunnel.

He sent the giant walker stepping carefully around the puddle of light and felt Ander's questioning gaze. "Muscle up ahead," he explained. "We have to break through before we can get up to the surface."

"Won't they just take us to this Chetter fellah?"

Lorny grinned, though his face betrayed little humor. Anders had a lot to learn about Chetterman. "Yeah, that they will, dead. And he'll get the goods, for free. Chetterman likes those sort of deals." He turned and stared at the strange pale face underlit by the green pip lamps of the panel instruments. "You're a funny cat, Anders. Sometimes, when you say crazy things like that, I almost think you're for real from the past, and not just some headcase."

"Tell that to them." Anders pointed beyond the canopy.

Man-shaped shadows were sliding with exaggerated stealth across the tunnel walls. Lorny muttered wordlessly under his breath and killed the arc spots. "Feet, do your stuff," he murmured, tongue caught tensely in his teeth. He increased the walker's stride pace by a factor of three. The sound of the footpads hitting the tunnel floor was deafening as it echoed back at them.

Dark figures scattered as the huge machine clattered toward them. One of the figures whirled something shiny in his arms and metal clanged hard against

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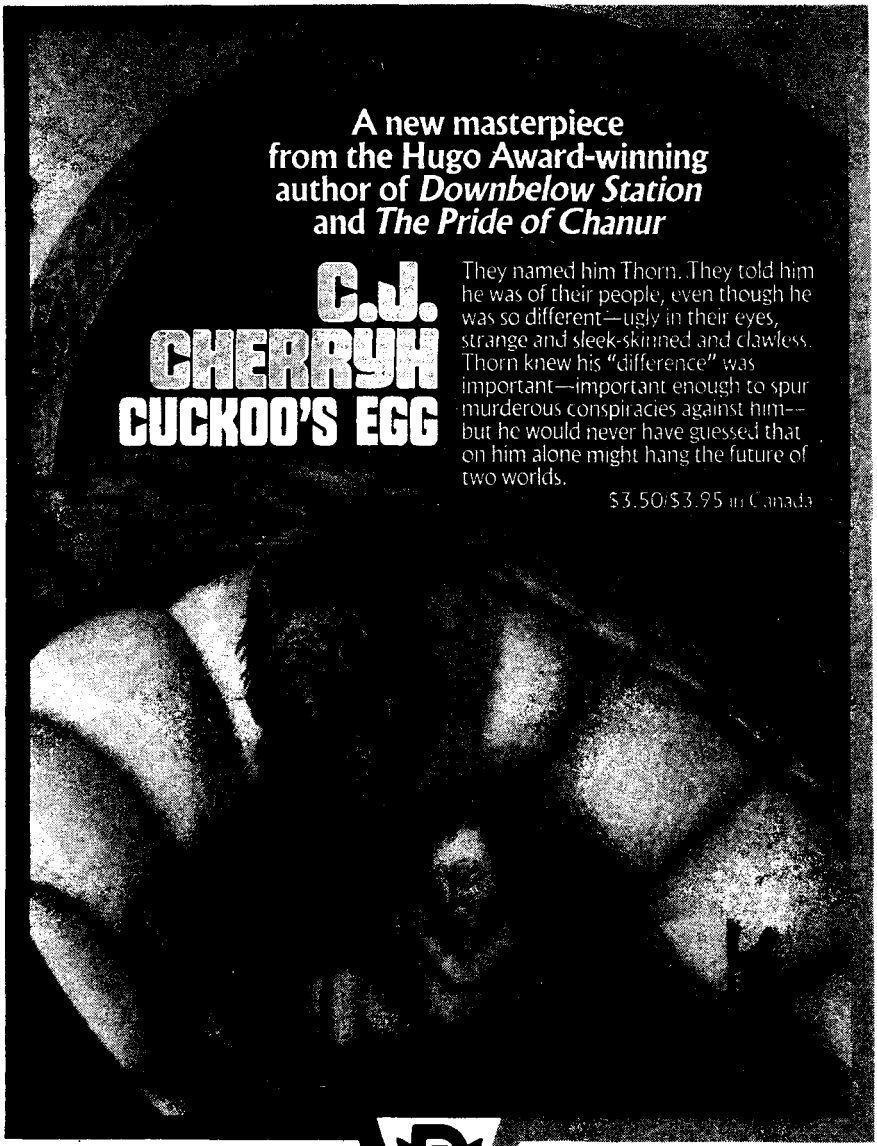
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the back of the control head, grated, then stuck.

Lorny snarled. "'Fraid they'd do that. You're going to have to go outside and knock that grapple off." The canopy puffed open with a sigh. "You bothered by heights?" Lorny inquired somewhat sarcastically as the man from the past seemed to hesitate on the brink.

Anders laughed strangely, then he was outside, hanging on with just one hand as he struggled with something, or someone, just out of Lorny's vision. Lorny heard a muffled thud, a scream, then the chubby man was back inside holding a dull tube with a glass handle.

Lorny grinned happily. "Good, you bagged a tickler. Check the charge."

"I see green on this little light next to the thingee that looks like a bi-polar blivit."

Lorny nodded, his thin face showing satisfaction, though he didn't have the faintest idea what Anders was talking about. "Keep it handy. A tickler can kill, or it can just stun; depends on how much juice you let out in a burst. We're under the Jersey swamps. The next ten inspection stations belong to Chetter muscle. They won't let us in without a seriously gnarly fight, emmissaries or no. The Weavers figgered they'd luck out one of two ways by sending me up here with the gift: maybe Chetter backs off their turf, or maybe they lose me. Either way, the way they figure, they're ahead."

"Why do it, then? Sounds like a cold blooded mob on either side of the fence."

"A guy's gotta eat. It's a cold world."

Anders shifted uneasily in the darkness of the control head. "I know, I saw as we were coming down. You've got ice sheets all the way south from the arctic to Detroit."

Lorny blinked. "Huh?"

"Look, I told you, I came here from a long time ago, kept alive in a sleep unit, in orbit, up there." Anders jabbed the tickler toward the canopy roof. "We were waiting—for radiation levels to go down. We didn't think anyone else had survived after the, well, unpleasantness. There are dead areas still, a hundred years later. Some made it. But things have gotten strange. This lot you've shown me is a surprise."

"You're from the Good Times." It wasn't a question, but Anders must have thought it was.

"Something like that," he scratched suddenly at the dark stubble encrusting his chin. "Goodness is relative."

Lorny grunted. "Chetterman's going to like you."

"What do you mean?"

"Nothing. Keep alert. We have to make our way out of these tunnels up to the surface before too much longer. I intend to get this run to Chetter's digs if I have to shag the pads right off this feet. Get me?"

Anders stopped clawing at his chin and leaned forward, propping his arms against the forward panel. He peered out into the darkness, oblivious to the green-hued reflection that stared back at him from the armo-glass bare inches from his face. "You're the driver. I'll keep my eyes open."

The transport tunnel branched once, then again where a battered multi-car train lay on its side, sprawled all the way across tracks that were now just

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lines of rust on the rocky roadbed. Lorny gingered the walker across the sagging metal strips on manual. "Easy baby. That's nice, careful—damn!"

The hole had been concealed under a loose plate of steel now scabby with rust. The left pad sank deep, and the whole unit lurched heavily onto one knee. Lorny cursed as a red telltale warbled a damage report. Slider pylon twisted. Not good. Maybe the Cruiser could repair it in his shop, but his shop was far away.

Anders looked over, his face tight with concern. "Serious? Can I do anything?"

"Shut up," Lorny snarled, angry with himself for trying to go too fast.

He made the unit stand on one leg while he extracted the trapped pad. Okay, it wasn't terminal. The leg still functioned. He experimented, walking a line. The unit moved with only a slight limp, and Lorny sighed with relief. Still, it was serious. The limp would probably get worse with time as tolerances grew worse. It wouldn't matter now. But later it might kill them.

Sunlight again, slanting down from a wide stairway descending to a platform of the main tunnel. A line of grotesque armed shapes waited in the shadows, hair stiff with gray mud —butchwaves pointed and smoothed into a kind of helmeted casque. Lorny saw leather armor with a yellow splash on the chest plate. The gang-bosses had faces painted blue. Some of the skirmishers had ticklers. Others held long pikes with wires dangling from copper-colored spearheads. Lorny wrinkled his nose in concentration. Tricky; they had shockers. Where had Chetterman gotten those?

"This won't be easy," he told Anders. "I'm going to feint."

Anders put his hand on the canopy hatch. "Want air?"

"Can the humor!" Lorny charged the line, sparking the ground with laser fire. These were hardheads, heavy-metal bandits. Nobody ran. As the pikemen rushed forward, he sent the walker springing backwards, then forward. Now he jumped. The unit went sailing through the air, landing heavily among the remainder of the line. It recovered with a screech of strained metal, and pounded up the stairs. The guards trailed after, ululating rage.

"Well that they're upset," Lorny crowed with undisguised pleasure. "They'll all be dead when Chetterman finds out they let us through."

"Can he afford that? There're so few people left now."

"Hell. Men are cheap. It's women that're hard to get." He laughed. "Maybe he won't kill them right away. With Storm season this close the food mines will probably need all the laborers the pressgangs can raise. Come Fall, though. . . ." Lorny smacked his chest graphically.

The walker lumbered up the last few risers and out onto a rolling plain dotted with stiff tufts of grass. Low mounds of reddish material rose here and there. The mounds extended as far as could be seen. Near the horizon, gray forest started, and beyond that a sheer purple-white cliff capped by puffy cloud.

"Close." Anders breathed. He was staring at the distant ice. "I didn't realize. We're in the city, aren't we?"

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"Not as far as I know. This is just junk. Manhattin's up that way. You'll start seeing the tents before long."

Anders started choking, or was it laughter? He seemed unable to stop. Lorny slammed him hard on the back. That broke the reflex chain. Anders wheezed and coughed, then smiled.

"Sorry. I forgot you've never seen. . . . Aw shit, forget it. You wouldn't understand."

"Don't be pulling any of those stunts in front of Chetterman. He'll have you gutted for his evening meal; I've heard he does that. Fat as a sow boar, he is. Keep your manners about you or we'll both be dead, and that will upset me plenty."

They passed a foursome of dented, weather-stained feet: two-legged walkers squatting at rest beside the dirt roadway, the scruffy-looking riders staring belligerently at the intruders while they tended a tiny campfire. A skinned monkey rat was turning on a spit over the flames.

"Those fellows eat game," Anders commented.

"Barbarians eat anything," Lorny growled. "Only the Weavers are civilized enough to eat only the food of the Good Times. It's bland, sure, but it keeps the soul fit."

"Amen," Anders chimed in dryly. "And where do they find this food?"

"In rooms deep down. Only decent folk are allowed through the portals. They mine the food packages, and leave offerings for the sleepers in return for the priviledge."

Lorny sensed a sudden change in Anders. Fearing another fit, he slid a hand down to his tickler, keeping it there just in case the stranger were to get violent.

"These sleepers, are they in ceramic cases?" Anders seemed unusually tense considering their situation.

"Those that look alive. Most are just bones. You can see 'em through the glass panel."

"The Weavers keep them safe?"

"Yes. Why is this so important to you?"

"Those sleepers were intended to survive, through a long, long time. But there was a limit, what was assumed to be the ending of the dark. They have to wake soon now, or they'll die. That's why we came down. To free them from the . . . oh shit, call it a spell." Anders rubbed hard at his bristled face in seeming frustration. "There's a small control unit that monitors the sleeper units. Using it we can wake them selectively. The food was stored there for their use. The Mellennium founders knew there would be a considerable delay before crops could be sown and harvested. Have you found bags of grain . . . seeds?"

"The Weavers have. They plant a token crop each year. But they won't eat it. They harvest the best stalks and take the grain below as an offering to the sleepers."

Anders slammed a fist into the control panel. "Damn. Just great. Filthy barbarians destroying unit safeguards out of superstition."

He turned on Lorny. "Look, run me to the chamber. If you can't find the others I came down with, at least take me there."

"After," Lorny said firmly. "We have business with Chetterman first."

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"Okay, but let's just get it over with."

"That we will," Lorny said softly, hiding his smirk behind a yawn.

Tents marched along each side of the trail, some twenty deep, backed against tall stands of bluish evergreens. The trail ended at a broad plaza of beated clay. Here the tents had become many colored, multi-poled affairs covering almost an acre of ground.

Lorny explained the arrangement. The largest belonged to none other than the Mead of Manhattin, Hardhand Chetterman, Foodgiver.

Lorny stopped the feet and made it kneel.

"Here's where we get out. Mind your manners. And carry the offering."

Anders struggled to pull the bulky box from behind the seat. It tipped as he pulled it up and the lid fell open, revealing the contents: a metal and plastic case. Anders stared at the gleaming lights of the ancient controller. There was no pretending that he hadn't recognized it for what it was.

Lorny saw and acted fast, slamming the butt of the tickler down across the back of the stranger's head. Anders groaned and collapsed. He landed heavily. Had Lorny killed him? By the killerbird, no! Lorny bent and touched the side of the stranger's throat. Yes, a pulse, and his breathing was coming ragged and slow. Anders was alive.

For some indefinable reason, that made Lorny feel good. He pulled the box free. Delivery time. The Weavers were rarely wrong, and they intended this as a gift. Lorny would deliver the box. No matter what. There was a reputation as a runner he had to maintain.

A ragged crowd had gathered below. Lorny clambered down the ladder from the control head, gift held high above him. "I bear a token from the Weavers of Jersey for the great Chetterman. Who will take me to him?"

It was unnecessary to ask. Two garishly tatooed guards stepped forward at once, waiting. It was no great difficulty to attain an audience with the Mead of Manhattin, it was said. The trick was in being allowed to go free after.

The Mead had increased his girth since Lorny had last seen him. His once brawny frame had now gone to fat, nearly filling the scarlet draped couch. A ringed hand idly acknowledged Lorny's presense and waved him forward at the same time. It was tempting to see little more than a vast, puffed-up toad lying there on the silks. Still, Lorny reminded himself that the gray eyes half buried under folds of fat were cunning and sharp, like a snake's.

Lorny bowed. A slender green-dyed girl waited alertly beside the couch. She was young, dark, and really quite beautiful were it not for the clay-coated hair and wooden decorative spindle wobbling in her nose. She favored him with a look reserved for something on the bottom of a nightgutter and seized the box, carrying it proudly to the Mead.

Chetterman's face registered little emotion as he studied the device, but Lorny noted that he was careful not to touch any of the buttons, or softly glowing telltales.

"Tell me of these Weavers," the Mead intoned.

Carefully, Lorny admonished himself

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again. Think. "Poor folk living along a marginal wasteland to the south of your domain. A strong buffer against barbarians swarming north. An alert people who offer their allegiance unbegrudged."

"And what is this?"

"A powerful device from the Good Times, preserved these years by the reverence of the Weavers. It is irreplacable, as you can well imagine."

"There are, perhaps, more of these devices?"

Lorny felt a sweat begin at the edge of his brow.

"None that I am aware of. The Weavers say not."

"Hummmmmm." A casual wave of a huge hand caused the box to be carried away to the rear of the tent. "We must speak with these Weavers more upon the subject of boxes. Remind me." The scribe to which this was directed nodded diligently and scribbled quickly on a waxed tablet. Lorny felt the sharp eyes on him again. "What of this stranger who came to us with his head bruised, and so remarkably well groomed and pale for a barbarian. What can you say on this?"

"He comes from the Good Times."

The Mead sat up, no small feat considering his bulk. "Must I say that I find that very hard to accept?"

"No, but it is true. I saw his ship, only briefly mind you as it zoomed overhead, half hidden by trees—and then I found him, wandering, starved and delirious from a fever."

The fleshy face seemed to close in on itself. The Mead beckoned to the scribe again, whispered quickly in his ear, and then clapped his hands sharply. "We

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thank you for the Weaver's gift, and for your ingenuity in reaching this enclosure. You will be our guest."

Damn! "Thank you, very much indeed, but I am a runner, and I must hurry on. Please do not think me rude—"

The fat hand raised, flicked once, twice, at the waiting guards. They came forward quickly and Lorny found himself supported at the shoulder, feet dangling far from the ground.

The Mead was smiling. "Please, I insist, enjoy our hospitality. So few can in these hard days."

The drafty tent was dark and cold. It was well past the middle of the night and a chill wind moaned outside toying with the badly tied flaps.

A hand touched Lorny in the darkness. He jumped.

"Hold still, little snake," a voice hissed. He recognized it as the stranger's. Something sharp sawed at the ropes binding his hands. They parted and he was free.

"If this was part of your plan, it worked. But next time don't smack me so hard; you nearly cracked my skull. They must have thought I wasn't fit to move or they would have bound me more tightly. Too bad for them. The guard on my cot feels worse than I do. This is his knife."

A pale face hung above him. "What now?" Lorny found himself studying the gleaming knife point with grim fascination. "You're going to stick that in me? Go ahead. It's fair."

"Maybe fair—you deserve it, right enough—but not smart. You're going to walk me out of here and back to that chamber the Weavers have been using as a foodstore. But first, we've got to fetch that controller box."

"Impossible. They'll kill us."

Anders grinned, making his bruised face very unpleasant. "You have a choice, Lorny my boy: me, or them."

Lorny prided himself on being a smart runner as well as a fast one. The odds were better with the stranger. He might still kill Anders and escape. The answer came easily. He stood.

Anders shoved him from behind as they left the tent. "Where did they take it?" he hissed.

"I don't know. We'll have to look. I don't think the Mead trusted it much, probably thought it was some kind of bomb; you Good Timers were crafty at bombs. Just look around you."

Anders had. And it made him feel sick. New York had been smashed by multiple air blasts. There were no craters, nor much radiation left to speak of. But all the skyscrapers and other buildings had vanished, melted down to their foundations in a fraction of a second, blown away as atoms of iron plasma by the intensity of the fireball's touch. Even the statue of Liberty, gone, not even a stub of her stone base left. The Good Times, indeed.

Finally, they found it.

The controller was not far away, but it might have been for all the good the find was going to do them. The Mead had planted the gift in his treasure tent, an area guarded three deep with well-armed muscle painted in colors. It was plainly hopeless trying to sneak in, there were eyes everywhere, and fighting the armed mob standing about so alertly by the bound chests was equally senseless. After several hours, with the coming

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dawn bleaching the dark a sick gray, even the stranger admitted it too, and they withdrew, nimbly stealing back Lorny's feet almost as easily as they had brought it.

"They've slept this long," Lorny told Anders encouragingly, trying to get his one-track mind off the sleepers. "What's a few more years' nap gonna matter? They won't know."

"I'll know. Those chambers were set for a certain duration of use. Chemicals run dry, nutrients lose their potency. Hell, so you've killed a couple of thousand souls. Why should you care, anyway?"

Lorny glanced over at the stranger. "How many did you kill in your time? A million? A million ten?"

Anders looked at him with such pain in his eyes that Lorny shrugged and shut up. The walker continued stepping briskly across the grassy steppes, hobbling slightly as the damaged knee joint flexed. The sun came up slow, and promptly hid behind a bank of thunderheads brooding over what had been the Maritimes. If the Mead had put out a catcher party it was not apparent as yet.

But the Mead wasn't their immediate problem. The Weavers were, or perhaps the Cruiser—though idle revenge wasn't his style. Someone had found Lorny's shelter. Someone had cleaned house.

The wood and aluminum had burned bright and hot. Blobs of semi-molten glass still smoked within a blackened circle on the ground, and the crumbling tunnel stank of carbonized hydrocarbons. Lorny coughed once, shoved a rag to his mouth and backed out into the sun.

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"Nothing left. They torched it all."

"Weavers or Chetterman?"

Lorny gave the stranger a weary glance. "Does it matter? Everything's gone."

"You've got the walker." Anders was irrepressible.

"The Cruiser's walker; it's his, I never bartered him off for it. Call it a forced loan. He'll probably outcast me because of the damage."

"Kid, I don't think I've ever seen you like this." Anders folded his chunky body up against a tree stump and sat in the dirt. His hands played unconsciously with a stick. "I thought you were the ultimate hardhead, so cussed and obnoxiously in control of your environment—however shabby it might be," he added unnecessarily. "None of you squatters are supposed to be alive, not you, not Weavers, and certainly not that throwback Chetterman and his gang of thugs. I don't think you realize how thoroughly our two sides plastered this world. When I went to sleep, it was dead, a smoked out cinder. How'd your family get by?"

Lorny shrugged. "The woman who raised me—taught me—never talked much about the early days. I think she mentioned something about coming over from islands. She hated the dark; always kept fires burning in the house, even during the heat of summer. I don't remember anyone else.

"Once we got up Jersey we started to meet people, little clumps here and there, living off of what they could find, and digging through the occasional ruin. Manhattin was always best for that, what with the underground network nearly untouched. But Chetterman's got that all to himself, now."

Anders nodded. "That's the way it usually works." he broke the stick and tossed the pieces aside. "I think it's time to make some decisions; we can't stay here. I want to meet the Weavers. And I want to see the sleeper chamber."

Lorny frowned and shook his head stubbornly. "You're crazy. But not as crazy as the Weavers. That's why I won't take you. They'll kill you. They kill everyone they find in their territory."

"They didn't kill you," Anders pointed out. His was a wholly innocent brand of logic.

"I'm a runner. Nobody kills a runner. Okay, Chetterman sometimes, but he's losing touch. Someone's going to come down on him for it, someday; bet on that. Runners are granted on-trail sanctuary. We're special."

"So are sleepers. They know things the Weavers and Chetterman never knew, and never will unless we let them wake."

Lorny had a sudden uneasy thought. "You said there were thousands; that's more than even Chetterman's mob. Maybe waking them means they'll take over. All of a sudden we'll be working for them, and runners'll be delivery boys. I know how that game goes. Is that part of your plan?"

Anders shrugged and rolled his eyes helplessly. "It could happen that way. I'm not saying it won't. I'm a technician, not a political sociologist. It's up to you to decide if you want to let this particular genie out of its bottle. Once it's out it might help you, or it might

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make you its slave. But it's your choice. How lucky do you feel?''

Luck. Now that was a good one. Lorny pulled his ragged skin coat tighter about his shoulders and grimaced. ''I've figgered out why your kind blew themselves up: you're dreamers. You can't see things as they are. Naw, you're too busy changing things around the way you want them to be. But you make mistakes. Big ones. Faulty vision, man.'' He spun on his heel and began hauling his skinny frame up the access ladder on the walker. Midway up, he paused and threw a challenge down at Anders. ''You commin', or not? It's your idea to meet the Weavers.''

Anders jumped to his feet, surprised by the sudden shift. ''You're taking me?''

Lorny shrugged. ''Man's only a fool once. Maybe you get a second chance. I know a priest. . . .''

They were still a long way off from the Weaver encampment when Anders spotted smoke billowing above the trees and pointed it out. Lorny urged the walker to a faster pace and armed the lasers. The machine surged over the last barren line of hills that separated Weaver territory from the sea swamps.

''Why do they call themselves Weavers?'' Anders asked suddenly.

That was an easy one to answer. As smart as he was, Anders had missed the obvious. ''They weave dyed grass fiber and assemble it into baskets, clothes, even tents. In winter they line their snow huts with mats for insulation, so they sleep warm, and not even Chetterman can say that.'' Lorny stopped talking and halted the walker suddenly.

The Weaver camp sprawled across a shallow valley. The smoke was coming from there. But the fires, once hot and raging, were now little more than wind devils of sparks as the hut frames collapsed into ash. Not much remained to burn. A strange angular craft squatted among the smoldering ash heaps. Light colored shapes could be seen dimly through the smokes.

The man from the past cursed. ''Where's that priest gonna be,'' he snapped. ''Can we still reach him?''

A Weaver in a long yellow robe darted suddenly from one of the burning structures. A white figure materialized from a swirl of smoke, whirled and shot. The priest fell, flopping like a badly sewn doll.

Lorny heard Anders let out a long sigh.

''Your folks?'' Lorny asked coldly.

Anders nodded. ''The genie's out. But not the way I wanted.''

''I told you earlier, the Weavers are suspicious and quick to anger. They would have attacked as soon as your ship landed. It's their nature. They did make good mats, though.''

''We'd better go down. Maybe I can call off the guns.''

Lorny put a restraining hand on Anders's shoulder. ''Not quite yet.''

Anders turned a worried face from the slaughter. ''Why?''

It happened fast. with no time for Lorny to explain. The ground trembled and heaved upwards like an inverted bowl. The stationary walker swayed drunkenly and nearly fell. Stones cracked against the hull of the control head, taking chips out of the armo-glass. Dust

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swirled tornadolike as the noise of the concussion set their ears ringing.

Anders attempted to open the canopy. Lorny hit him in the face and held the canopy shut. "Wait," he ordered. A storm of fire hit the walker and swept on past.

The trees standing behind them ignited, became raging torches.

A gaping wound yawned in the earth before the walker. The explosion had swallowed up both shuttle and burned village. Shards of glass and polished metal gleamed in pale sunlight. There were bodies, hundreds, strewn everywhere, whole and in fragments.

Anders swallowed hard.

"The Weavers were a distrustful folk," Lorny muttered in an unusually gentle voice. "What they couldn't have—" he paused, then began again. "That's why I wanted to keep you away from them. I know how they think. Gods are best kept distant. The sleepers could never have been allowed out, it would have revealed them as mere men and women."

"Some thought like that where I came from," Anders murmured.

Lorny backed the walker from the lip of the chasm. He didn't like the way the grassy edges of the hole kept collapsing into the smoldering depths. "What now? Chetterman? We have land to negotiate with. We could be bosses."

Anders was shaking his head. "First we bury the dead."

"That'll take days."

"I didn't ask you to help." Anders popped the canopy.

This time, Lorny didn't stop him.

After a while, feeling guilty, he climbed down to help with the sorting. It was filthy work. A few of the bodies looked almost alive; and some were beautiful. The explosion that had ripped open the preservation chambers had been surprisingly gentle to the sleepers. But all were dead. Strange, Lorny considered, tugging what remained of a scholarly looking fellow into the mass grave they had prepared, to have escaped hellfire and time both, only to die with the ending so close.

It took all day to clear the crater of its dead. As the sun slipped behind low, cloud-wrapped hills to the west they crawled back into the walker and slept the unmoving sleep of the exhausted. When Lorny woke at last the sun had reappeared and was already high in the yellow-tainted sky. Lorny stretched agonized muscles.

Anders still dozed. Lorny turned the walker south, letting it move at an aimless pace, in no particular direction. It felt good just to be moving.

Rain came later, then hail, and a shrieking wind that buffeted the walker dangerously. Storms were building. The cold season was growing near.

The stranger woke in the middle of the afternoon, having slept like one dead through the storm. He pulled a folding map from a battered case he always wore around his waist, even in sleep, and stretched it across the control panel. His lips moved as he studied the patterns on the paper. "Here," his finger pointed suddenly. "Here's another."

"Another what? Another tomb?" Lorny was depressed from his charnal house labors. He envied Anders his dedication. Fool though he was, he at least had direction.

"If you'd prefer sneaking this walker

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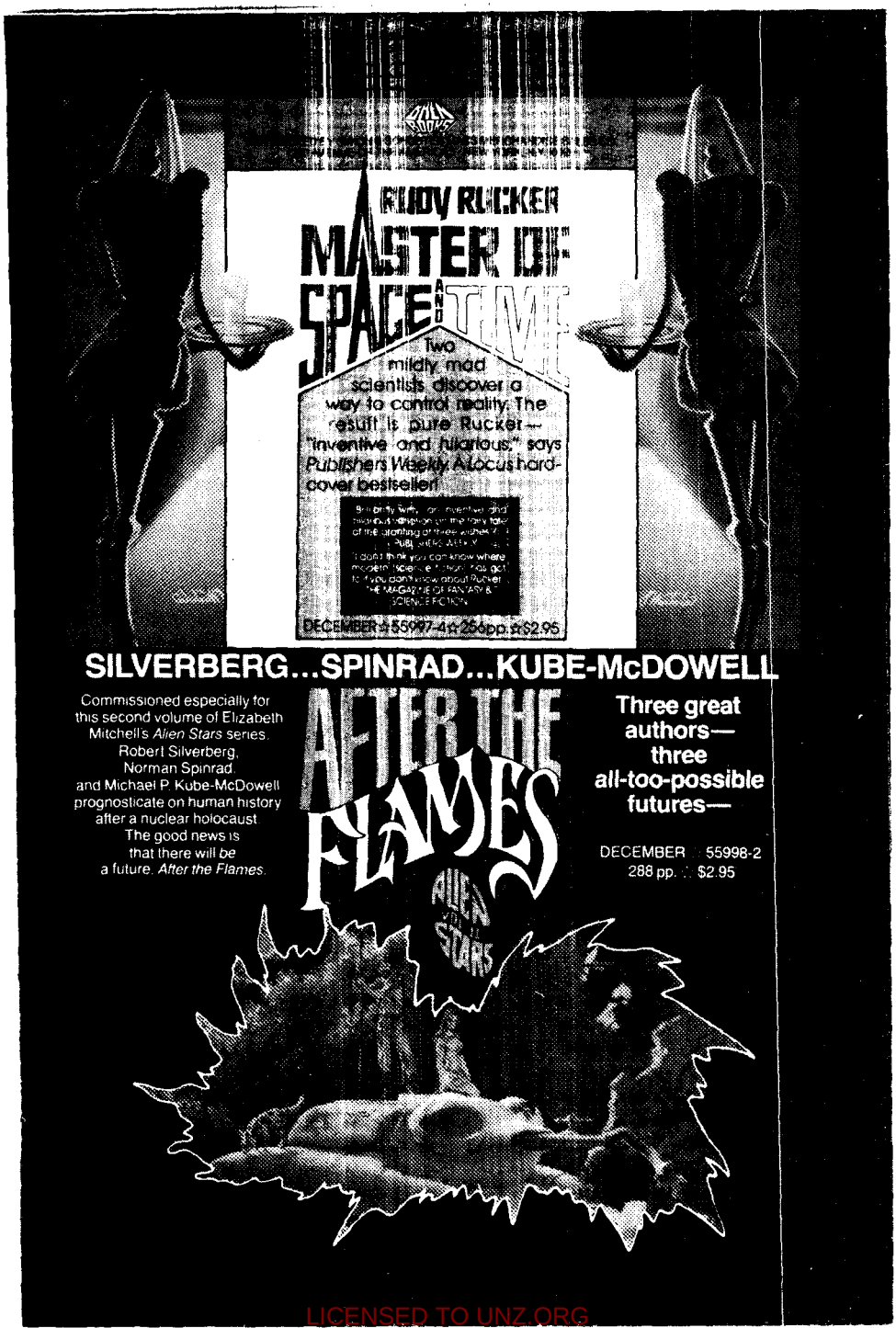
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back to the Cruiser, go ahead. I won't stop you. Consider what you'll be after you do it, though. Not a runner, that's for sure. Chetterman will probably take you under his wing if you crawl properly. I imagine he'd still like to get my knowledge of the past. I'm a treasure, I know where all the juicy ruins are." Anders hit the map with the back of his hand in emphasis, "They're all here, marked down in red and black."

Lorny slowed the walker. "Smart man, aren't you? Sometimes it's so easy to be smart. The woman who raised me remembered a story, just one, it was all her poor head could hold. She'd drone it out each night over and over while she tended her candles and tried to put me to sleep. It was about a traveler who, according to her, who planted trees all across a place that I suppose doesn't exist anymore. He was a walker, not a runner. But by the time he died, he'd put food trees from this coast to as far as the Western mountains. You know, runners are like that, too."

Anders gave him a blank look.

Lorny grinned. "And I thought you people from the past were smart." The walker accelerated again under his touch. "We've got the feet, and you've got the routes right there on your map. I was thinkin', maybe we come back, later, after finding some more of your sleeper sites, and old Chetterman finds himself with some competition. Those people of yours that are iced away: they know how to fight, don't they?"

Anders did something to his face, making an empty expression without much humor in it. "Oh, yeah. They know that all right. Lord, they sure do know how to fight."

Lorny nodded. "I thought as much." The walker broke into a steady, ground-pounding trot. There were mountains ahead, tall, capped with white.

The ice was up there, waiting. But Lorny knew it wouldn't last.

It never did.

There was always a thaw. Even after the coldest winter, the sun always came round.

As it mounted a ridge, the shining machine hesitated and for the instant that the last, golden light of the sunset caught it full, the battered warrior relic resembled an ancient gilded knight on a quest, limping, but determined still. All its sunsets considered, perhaps it was a knight of sorts, just one of the last, patched together with junk and spit, but still patiently searching out windmills.

Hope died hard. It took a lot of killing to keep it dead. And so too, the Earth. But damn them, the old ones like Anders, bloody killers that they were, had tried. And somebody, Lorny knew, would answer for it. A dying woman, determinedly trimming candles in the dark, had told him that.

He believed it.

But for now, he'd help Anders find his people and give them back the life that had been taken from them. He was not a judge, only a runner.

After the storms always came a time to build.

That was the way. ■

● Expect little of a peace conference where the delegates must be frisked for knives.

Kelvin Throop

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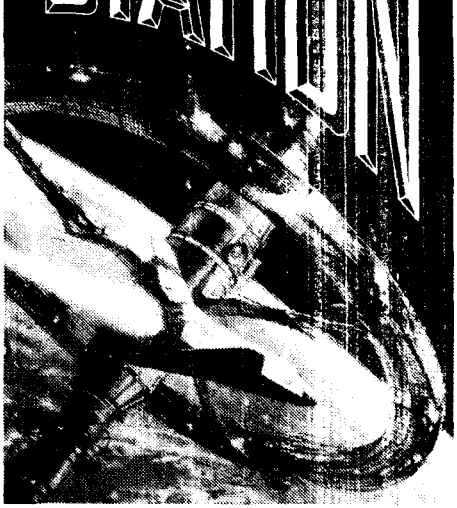

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J.E. Enever

THE BRUSH THAT PAINTED THE MAN IN THE MOON

This may be the key to solving an old problem—and we should soon be getting a new clue.

A fact stood out from our first glimpse of Lunar farside. It lacks the outstanding feature of the side we see. There are none of the maria that paint the Man in the Moon. Orientalis & Muscoviensis are but nominal exceptions; both are craters. The former is walled in concentric triplicate. Huge as Imbrium, it is *not* a basin. Differences between craters and maria may betray different blends of velocity and mass, and different constitutions, in the parent meteoroids.

Now maria are not merely on one face—they crowd into its half, are broadly north of the equator yet short of the arctic. Can this be chance? Suppose you are blindfolded before a revolving globe. At varying intervals, a buzzer sounds. At each of a dozen sig-

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nals you stick a pin into the globe. Uncovering your eyes you find them all within a single quandrant! Clearly this was no accident: somehow, the odds were rigged. The siting of the basins points to connected origin; in due course, I put forward such a cause.

I have heard only one other explanation: it was "off the cuff," and I won't buy it. Let me explain: the Moon is not a sphere but an ellipsoid. Its long axis runs away from the center of the near face, and the disc we see is very nearly circular. The shape was set by the tidal drag that holds it facing the Earth. It was alleged that the maria are outpourings of internal magma in response to the distortion. I am more than doubtful. If there was infilling it fell short; the depth of Imbrium, for example, is almost as great as the difference in axes. Nor can I see why the maria are confined to the North, nor why they extend almost to the pole of a shorter axis in the West, leaving the area between Nubium and Nectaris, just southeast of dead center, unadjusted. As I said, I do not accept the theory.

In fact the maria are generally seen as the result of enormous meteoric impacts. Which leaves us still to explain their siting. The notion of a cosmic toboggan run, with asteroids gliding down in sequence, just won't wash. The Moon turns one face to us but spins within the celestial sphere.

Could a *group* of asteroids have hit the target as one? I believe the idea straddles truth; but we must dismiss it as it stands. The group must circulate in an artificial Klemperer Rosette—a dozen or more bodies balanced around a common orbit, revolving round a common center of gravity. We would need to call in Larry Niven's puppeteers to create it. Furthermore it is unstable: the sun and planets would tug it out of balance. We can rule out both associations and sequences of asteroids. The maria, however, lie upon the Moon's *earthward* face.

En route to the target, the meteoroids passed near our planet. This simple deduction was pregnant. It brought me the notion of tidal disruption of a single parent meteoroid. The result, a meteoroidal salvo. . . .

First, a word on tidal disruption. Roche's classic study in 1848 dealt with *liquid* secondaries. It is commonly assumed that the strength of solid bodies is as nothing against the relentless heaving and hauling of a planet. (Presumably, in the long run . . .) Yet I sought in vain for analysis of the *way* the solid breaks up. I foresaw a snag; as it happened, the snag was my own creation, but it made my progress to a workable model a zig-zag.

Disruption seemed to call for appreciable time. Consider what is needed. At least likely impact speed—11 km/sec—we allow a total impact mass of 10^{17} tonnes. The energy delivered, 10^{35} ergs, may well suffice; though Imbrium alone has been allowed as much. The mass is that of an astroid nearly 500 km. in diameter.

Jazzing up the speed to the utmost, 70 km/sec, the mass shrinks by a factor of 40: we have 2.5×10^{15} tonnes in a 150 km. package. At a respectable in-

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terim of 40 km/sec we are armed with 10^{16} tonnes in the shape of a 300 km. asteroid. If you find all these missiles hard to swallow, I don't blame you. Breaking them up seems more than the work of a split second. (Let me add that Dr. W. Napier has discovered something here. He finds that larger asteroids are not so very far from their rotational limits. I don't know whether we must bid goodby to Ceres Mining Inc. or say hello to Pallas Demolition Corp.) To resume: cracks through rock take time to propagate. Fragments must rotate to attitudes where tidal differentials are highest. And so on. But Roche defined the boundary around a primary where tidal forces destroy; it is of course the Roche Limit, universally misrepresented as lying at 2.44 primary radii from its center. Standing the misstatement aside for a while this is 15,500 km. from the center of the Earth; only 9100 km. above the surface! At best, that calls for a darned close asteroidal graze. We ask it to fly through a ring only 30,000 km. across (missing the bull's eye!) The chance it will oblige is somewhat slender; but suppose it does so. Even if it grazed our atmosphere, at 40 km/sec it would spend *only twelve minutes* in the breaker's yard. I saw this as inadequate for smashing up a 100 mile boulder, and was still unable to see just how the break-up would proceed. Does the victim snap in half? Or do tidal differentials spall off the hither and yonder shell? There was no guide; I was confident only that nothing much happened in twelve minutes.

Now the time was set by that 2.44 times Planetary Radius misstatement. I turned to George Darwin's book, "The Tides" (Yes—he was Charles Darwin's son) and found the true formula, which is: Roche Limit = 2.44 × cube root of (Primary Density/Secondary Density) × Primary Radius (PR). The Earth is twice as dense as a stony asteroid; $3\sqrt{2} = 1.26$; push out the Rock Roche Limit to 3 radii!

(Would you believe I had to kick and scream last year to secure correction of that barefaced 2.44 in a learned journal? The Primary involved was Saturn; s.g. 0.7, the lowest in our system.)

Even 3 radii were not much help, but the correction brought me to Zag back on course. By no means incidentally, I recalled that Jupiter has tidally disrupted at least one Comet—Biela's, in 1846; it has not been seen since Jupiter broke it in half. I made some calculations. The Earth Roche Limit for nickel irons is 2.2 PR. A moonlet dense as Earth could orbit Saturn inside the rings at 1.25 PR. I found the description of Phobos's craters as "blowholes" rather misleading—a spongy Phobos would already be running within its Mars Roche Limit. I then worked the other way. A bulk specific gravity of 0.1 is wholly conceivable for a *cometary nucleus*. That sets its Earth Roche Limit at 9.3 radii—15% of the distance to the Moon. You can see the implication. With the limit thrice greater, the meteoroid spends longer time in danger; and the chance of entering the limit is 9 times as great. What's more—a body as tenuous as this must be weaker, more easily fragmented by tidal differentials.

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A dirty snowball made the model workable; but I was still unable to calculate the conditions under which it would break up. Endeavouring to make sure of this, I zigged again. A snowball could be designed that would very likely disrupt at minimum provocation. I planned to use Hydrogen snow: an exotic material, if we can apply the term to the commonest element in the Cosmos.

Now I still believe the variety of the Universe produces Hydrogenous Cometaries between the stars. At this point, however, Our Editor obstructed the fine, free flow of my imagination by demanding figures. This was his right; and his judgematic attitude eventually brought me a rich reward. I chewed the matter over for many months, and in the interim read *The Cosmic Serpent* by Drs. Napier & Clube. (Let me recommend it to you; and don't balk at their insistence that the processes they describe are at work *now*, here in our Solar System. They produced impressive evidence for this in a Royal Astronomical Society paper last Autumn, '84.)

Napier & Clube have shown that the sun's passage through Galactic Spiral Arms disturbs the Oort Cloud and other comets between the stars. In due time, huge cometary Matrices enter our system, disintegrate, and provide the populations of well known meteor streams, families of smaller comets, groups of such asteroids as the Apollos, and zodiacal dust. There is an offshoot of the Orion Spiral Arm known as Gould's Belt. The sun passed through it six megayears ago, triggering a spasm of their process.

I wrote Bill Napier, outlining my disruption salvo. He answered at length and resolved my difficulty; I am glad to take this chance to thank him for his generous help. Several points became clear: I was already in the groove in respect to the meteoroidal mass I envisaged. In fact, with certain adjustments which I already had in mind, my proposed mass is well under his Progenitor limit. I had also got its structure right. I saw this as far from regular; cemented together from roughly spheroidal building blocks; a cosmic clinker. Bill Napier tells me that Dr. B. Donn of NASA thinks this the most likely constitution. It confers all the fragility one hoped for. I no longer need to use Hydrogen—"ordinary" dust and gas will serve. (As Napier said, we can now await the findings of Giotto, and other Halley probes.)

My evaluation of an extended Roche Limit was also correct; and here, Napier added more figures than I dared venture. Tidal disruptions will vary as the square of Roche Limit distance. At 10 radii we have 100 of them for every impact on the Earth. But large comets hit the Earth at intervals of about ten megayears.

Tidal disruptions of comets occur at intervals of only 100,000 years. I'll build on Napier's frequency. (Don't for heaven's sake tag my speculations with his name—he deserves far better than such a fate.) His frequency gives us 45,000 salvoes in 4½ Aeons (1 Aeon = 10^9 years).

The Moon moves 5° to either side of the Ecliptic. Diagram 1 shows the band

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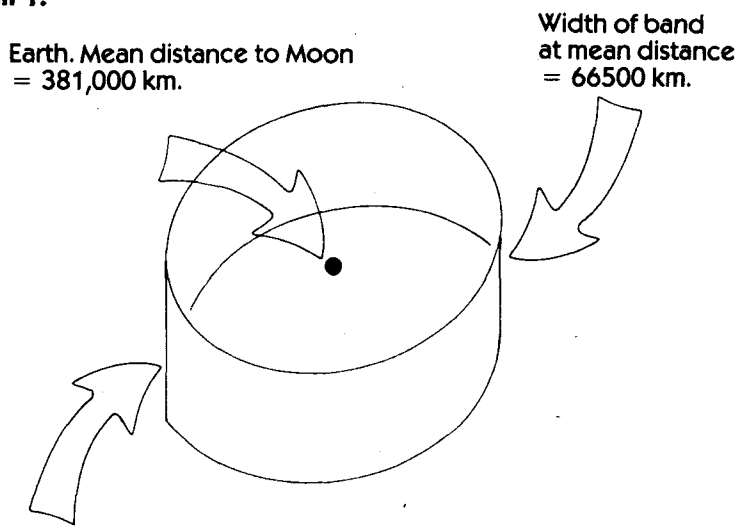
Diagram 1.



Orbital band of the Moon, which moves no more than 5° from the ecliptic either way. Salvoes hitting the moon must pass through this. Not to scale.

described by its possible positions. No strike is possible if a salvo passes outside the band.

Diagram 2 shows the maximum cometary inclination which can graze a 10 PR Roche Limit and hit an edge of the band. This inclination ("Slant to the Ecliptic") is 14.75°. The sample of all comets detailed in the BAA handbooks for '84 and '85, suggests that about 60% have *lower* inclinations. The figure will be near enough to use—

We have 27,000 salvoes passing through the band.

The next question is the shot-pattern of the salvos, Diagram 3. An overall scatter of 1°, which may well understate, disperses the fragments across 6,600 km. at the band.

4,650 such patterns cover the entire band.

27,000 are enough to spatter it completely, five times over. Is there an Astronomer in the house? Certainly, it will be no waste of time to consider the mechanics. I reckon that some 70% of the 27,000 actually score upon the band. I make no claim to first decimal accu-

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THE WARLOCK ENRAGED

by Christopher Stasheff

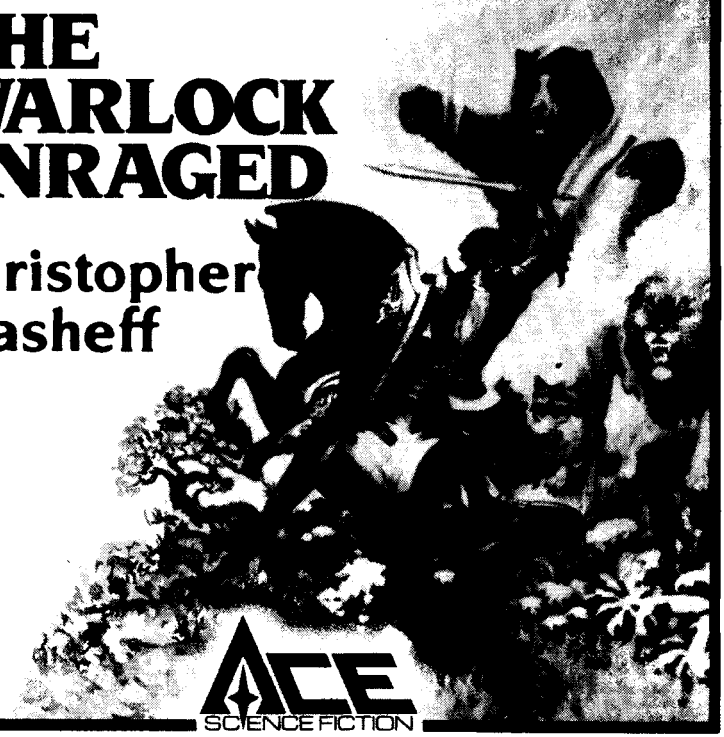

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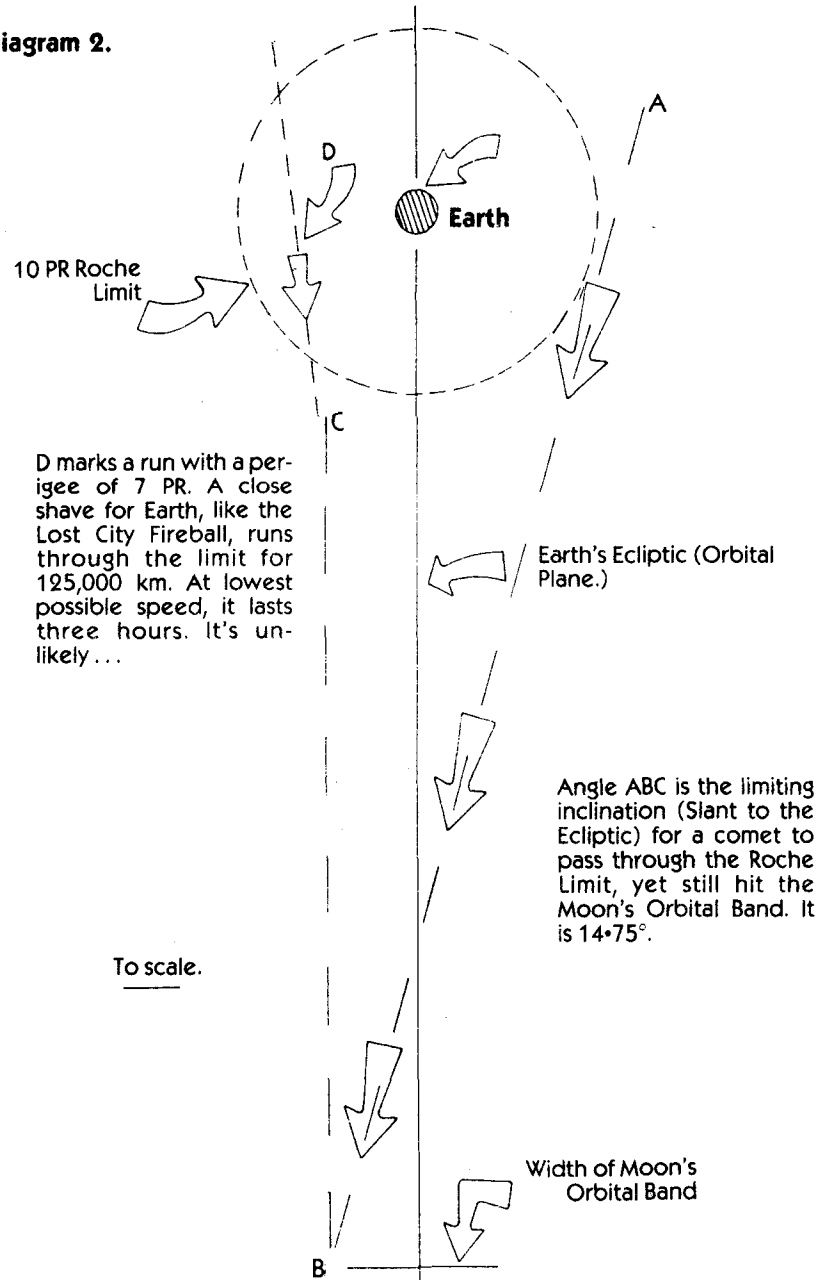
Diagram 2.


A
D
Earth
10 PR Roche Limit
C
D marks a run with a perigee of 7 PR. A close shave for Earth, like the Lost City Fireball, runs through the limit for 125,000 km. At lowest possible speed, it lasts three hours. It's unlikely . . .
Earth's Ecliptic (Orbital Plane.)
Angle ABC is the limiting inclination (Slant to the Ecliptic) for a comet to pass through the Roche Limit, yet still hit the Moon's Orbital Band. It is 14•75°.
To scale.
Width of Moon's Orbital Band
B

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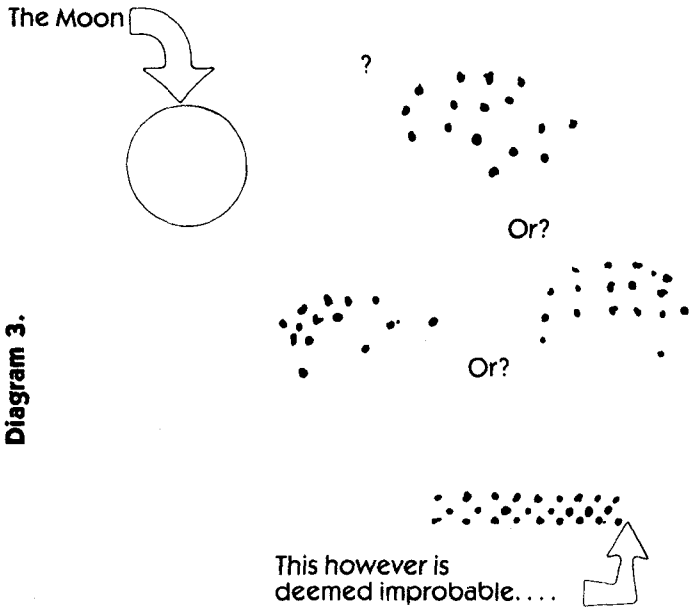

Diagram 3.

If the disruption products scatter over 1° around the comet's orbit the total spread at the distance of the moon is some 6600 km. This is nearly twice the moon's diameter. Possible shot-patterns are shown. Patterns will be three dimensional; but sideways scatter seems likely to exceed that along the line of flight.

racy: but the odds for an event are clearly positive.

Dr. Napier has cleared my mind (in itself a major feat) on this matter. He gave me tensile strengths of cometary nuclei; and the formula he has derived to find the critical period at which rotating cometary bricks fly asunder. Bricks are regular solids, but irregular clinkers will be fairly similar in behaviour. Critical rotation period in hours is:

$$P_{cr} = 1.2 \times 10^{-3} \times \sqrt{\frac{R}{T/d}}$$

R is the long dimension, in centimeters; T its tensile strength in dynes/cm^2; d, its density in grams per cubic centimeter. Tensile strengths of cometary nuclei are taken as 10^4–10^7 dynes/cm^2, or 2¼ ounces–145 pounds/sq. in. The tenuous structure proposed, bonded only "here and there," clearly involves the lower strength. Maximum size of a cosmic clinker may well be set by its spin. I'd

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expect the vectors on which parts come together to decide the spin of aggregates. Parts assemble to wholes only so far as the products' rotation allows. *Larger bodies are likely to spin as fast as they dare*. Putting a density of 0.08 into Napier's equation, the critical period for a 500 km. brick is over a *week* at the lower strength. (5 hours 22 minutes at the higher.) Below these times, it flies apart. The centrifugal "lift" within them maintains their low density; and the two factors so weaken them that they could be pulled apart with cords of damp Kleenex.

They will break at the least wrench from tidal differentials. In fact I suspect that, tilting to Earth's pull as gravity pendulums—a result of their size and asymmetric build—they start to part *before* they enter the Roche Limit.

We are ready to stage an operation.

Our frozen clinker is highly irregular. Its length of 500 km. is three to four times that of the shorter axes. It grew at random from rough components. We see cavities between these.

Its density is 0.08, betokening its Earth Roche Limit, 10 PR. Its orbit will take it to seven Earth radii; at closest, it is 38,000 km. above the surface. Its run across the danger zone is 90,000 km. At a speed of 40 km. per second, it is in the breaker's yard for 37 minutes. Even before crossing the limit it responds to Earth's gravity. The longer axis swings toward the center of the Earth. The twisting force is beyond the strength of a waist in its structure; this yields; it snaps. Even the parts are huge, and their sheer size will hasten their destruction—tidal forces vary as distance *cubed*, and what counts are *differentials* between tidal attraction, nearest the Earth, and tidal repulsion at the other extreme. This being so, disintegration is faster in the first part of the run. The halves break up, rough quarters become eighths; and so down-scale. Each breakage implies deflection from the comet's orbit. The salvo leaving the Roche Zone scatters. The spread in trajectories is only a degree. This, however, brings a 6,600 km. pattern at the range of the Moon.

The last leg of a six megayear journey takes about 2¼ hours. The sites of maria hint at an east-to-west spread; dispersed across twice the target diameter, more than half of the salvo misses, but fragment after fragment homes down to the surface. Every arrival is signaled by a blinding flash. Human senses cannot distinguish between its brightness and that of the sun. Indeed, the total luminosity of the salvo is almost in the same order as the sun's.

The work takes perhaps 25 seconds in all. The flare at Imbrium has reached its border when the blow falls at Crisium. Now the elliptical shape of Crisium . . . Does it reflect the angle of impact? That could not be true with a solid meteoroid. A loose cometary is another matter. Procellarum would be another instance. . . .

However that may be, the strikes have scoured the maria on the surface. They have painted the Man on the Moon.

Let us turn to the mass of the cometary. Many variables bar precision. We derive impact masses from impact ener-

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gies, and these have to be estimated. There are experimental figures for a range of explosion craters made by sticks of gelignite, Grand Slam bombs, and underground thermonuclear tests. The explosive energy relates to crater size by Law—energy varies as crater dimentions $^{3.4}$. A crater twice as wide as another employs $2^{3.4} = 10.56$ times as much TNT. We can deduce the energy which created an impact crater by comparing its size with the hole blown by a half megaton fusion bomb. Extending the 3.4 power connection into the impact crater range seems safe.

The extension is stretched further, into the impact *basin* range. Imbrium is credited with 10^{35} ergs, the power of a million million H-bombs.

I propose to cut a Zero or so from that number.

The encounter of the salvo with the Moon is a new field for exploration. It deserves expert attention but I offer this interim conclusion with some assurance: cometary impacts make sparing use of energy and mass. Let us say that a 20 km. asteroid delivers 10^{32} ergs at the lunar surface. At Mach 30 or more it is quite incompressible—works for many microseconds as a unit. Burrowing deep it blows out Copernicus. A cometary with the same energy does not behave in the same way. In the first place it cannot burrow as deeply for it *makes contact* with a vast area, perhaps 10,000 square kilometers. It smacks this as one, at 10^{18} ergs per square centimeter. Nor is it incompressible: its porous structure allows it to "telescope" along its line of flight. It flattens somewhat. I believe this polarizes the initial blast—directs this out across the surface. (See Diagram 4.) But expansion *opens* from an area the size of Copernicus! It has a head-start of 50 km. from dead center. The advantage is worth a great area at the perimeter. What is more, the comeatry is rich in hydrogen (Combined, if not free). So it's specific heat is higher; flare temperatures are lower, less heat is wasted by radiation. Thus more heat works in the blast: it is more blast-efficient.

I make bold to say that the energy allowing an asteroid to blow out Copernicus allows a cometary to shape a lunar Mare.

That *is* bold—the saving is two or three orders of magnitude—but I stay with it and await debate. My assertion points to a fragment of some 10^{13} tonnes. About a dozen—they are mainly smaller—create other maria: another dozen miss the Moon. We have 10^{14} tonnes for the body which entered the Roche Limit. Napier and Clube expect their Progenitors to range up to 10^{16} tonnes. They suggest that we have one in the Solar System *now*. This is Chiron. Chiron is given a diameter of 350 km. The shape and structure of a body which orbits between Saturn and Uranus are of course conjectural; but its orbit is described as chaotic. According to other sources Saturn altered it only three centuries ago. (Newton was 38 years old in 1680 A.D.) Napier and Clube further suggest that there is an undetected cometary fragment now in circulation. Its size is perhaps 30 km., and it will be found in a Beta Taurid orbit.

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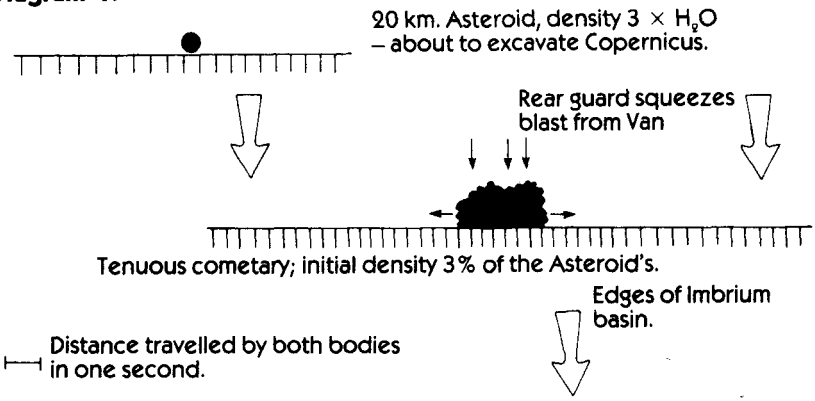
Diagram 4.


20 km. Asteroid, density 3 × H_2O
– about to excavate Copernicus.
Rear guard squeezes
blast from Van
Tenuous cometary; initial density 3% of the Asteroid's.
Edges of Imbrium
basin.
Distance travelled by both bodies
in one second.

HOW IS A COMETARY TRANSFORMED INTO A BLAST-FRONT?

Its porosity permits considerable compression. But at 30-40 km./sec. its rear travels two or three seconds behind its van. Before the overall consolidation is complete, the van has experienced impact: & exploded as superhot gas. Clearly, this blast cannot travel as fast as the comet. So its initial instalments are forced radially outward. The effect cannot continue to the end, but should be significant. It will greatly enhance blast across the surface &, oddly, *should be more pronounced at lower speeds.*

I must deal with one last point. We have isotope datings for Apollo mission samples:

Mare	*Age, Aeons*
Nectaris	4:20 ± 0:05
Humorum	4:16 ± 0:04
Crisium	4:13 ± 0:05
Imbrium	4:00 ± 0:05

The overlap of uncertainties allows the first three to be seen as simultaneous. Experts could not rule out inclusion of the last. I do not leave it at this.

The possible errors are technical: rooted in the methods. They take no account of other factors. I see it as highly likely —not just possible—that the Basins were not merely contaminated but lightly blanketed by ejecta from cratering impacts both within and adjacent to the maria, in the tail-down of the Bombardment Era. Material flung first and farthest from a cratering impact is likely to be molten. . . . The recent event at Tycho sent material a thousand miles. Notice that its deposition was highly localized, and intense enough to be seen from Earth with telescopes of moderate power.

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There is also human error. The first Iridium determination from the Alvarez layer was haywire. The analyst had a platinum wedding ring; she didn't dip it into her reagents, she only wore it. A quarter century ago an ancient meteorite was dated. When the results were checked they were found beyond the sensitivity of the apparatus used to obtain them. The workers had been overenthusiastic. Mistakes can be made. . . . Nor can we see techniques as perfect. With another, tree-ring datings on specimens from Pharaonic Egypt disagreed with those obtained by the C_{14} method. The upshot was that the C_{14} dates were shown to be in error. The C_{14} scale was accordingly recalibrated. Who can say that Four Aeons have brought no interference with Basin datings comparable with the C_{14} bugger factor?

The siting of the Maria is no accident.

I will gladly retract my explanation, if and when a better emerges. Yet, asked to choose between it and those datings —which will stretch to allow it—I plump now for my theory.

I look forward to the comments which *Analog* articles always secure. Let battle commence!

It's odd: when I wrote my first piece, two decades ago ("Giant Meteor Impact" *Analog* March 1966) I little thought the subject would become a matter of mundane concern, taken up by truly high talent. Get a load of this: Napier and Clube predict a possible climatic excursion in 2200 A.D. ± *200 years*.

H'mmm . . . I mustn't lose sight of the ex-Army mukluks in my attic. ■

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"The Microstructure of Terrestrial Catastrophism," Clube & Napier, *Royal Astronomical Society Monthly Notices* 1984, 211, pp. 953-968. Their references point to a wealth of further reading.

WAIT TILL NEXT MONTH . . .

. . . to send in your AnLab votes! The 1985 *Analog* year isn't finished until we publish our thirteenth issue, Mid-December, on sale November 5th. Look for the AnLab announcement in the Mid-December issue for complete details . . . and then vote for your favorite *Analog* stories!

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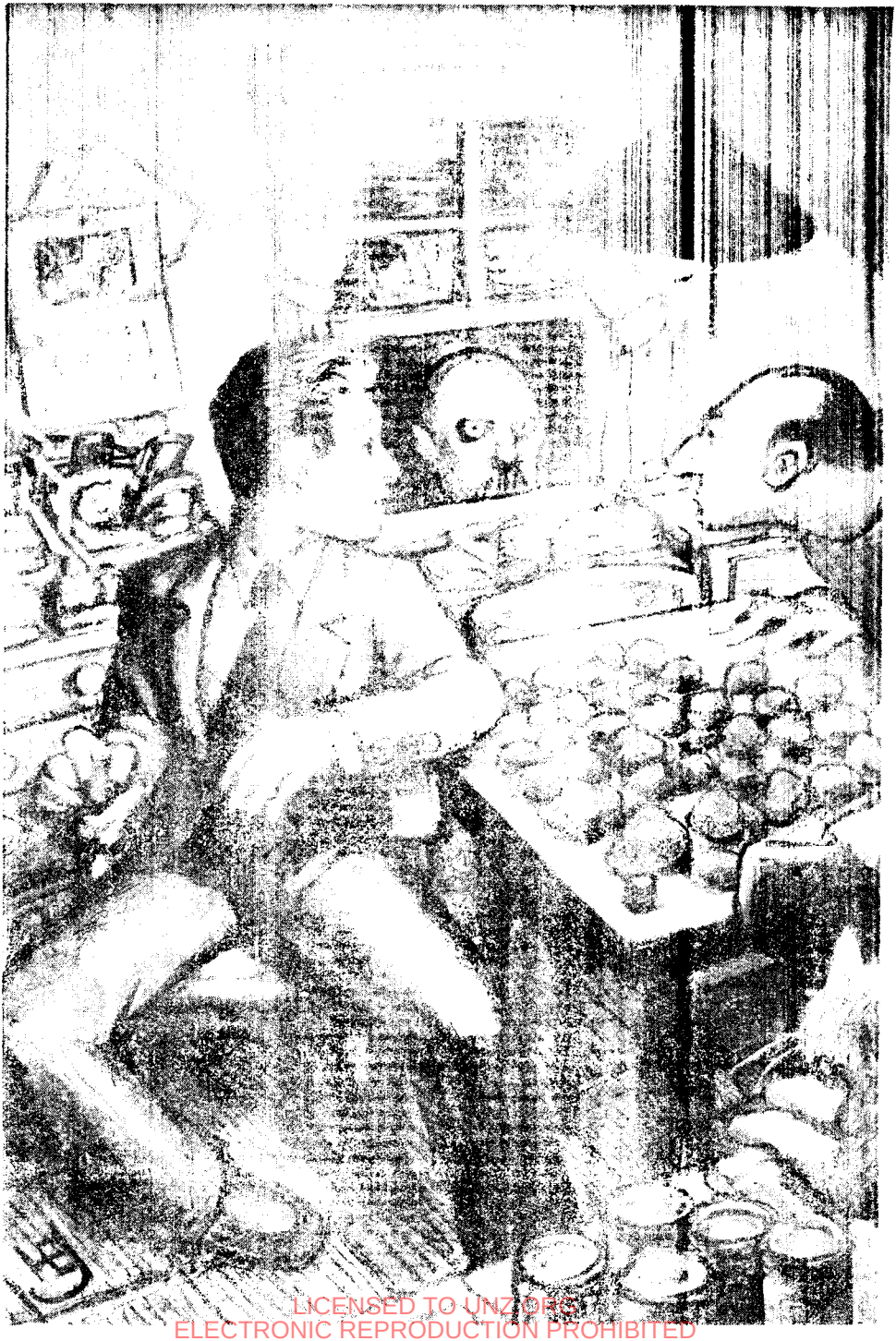

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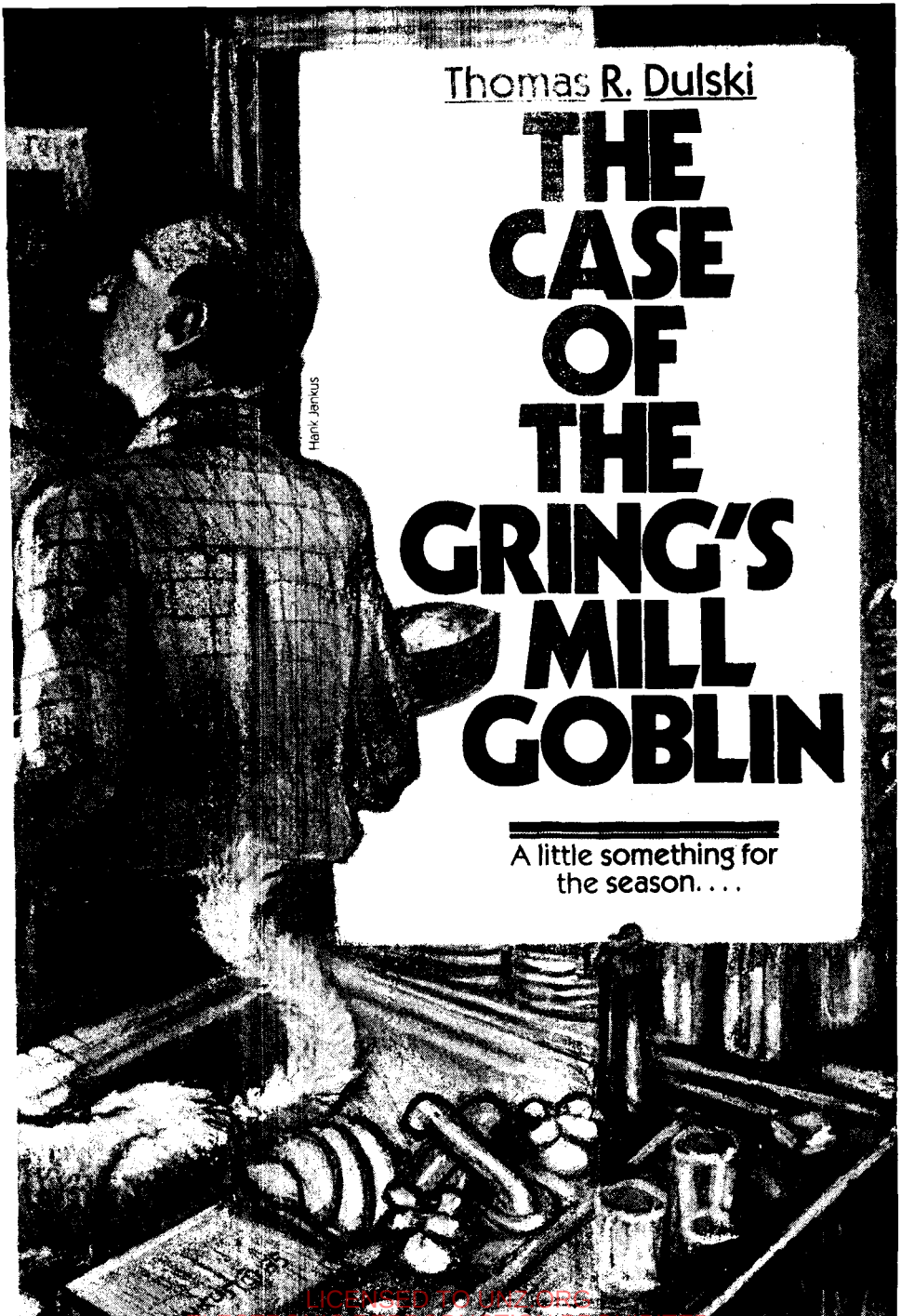

Thomas R. Dulski

THE CASE OF THE GRING'S MILL GOBLIN

A little something for the season. . . .

Hank Jankus

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The personal rewards of a career in industrial research are considerable. I can say that even after a full decade of the lab politics, obtuse management, and ambitious assaults from each year's crop of recent graduate recruits. The research assignments hadn't been earth-shakingly profound, but each had been interesting and challenging in its own way. I'd developed a decent working relationship with most of the R and D Center and close ties with a small knot of colleagues I liked and respected. I was satisfied with my job at Monash Chemical, and if the world economy would only cooperate, I would have been inordinately pleased to spend the rest of my working life in their employ.

That is not to say that I didn't look forward to weekends. I had been recently married, and the joys of connubial bliss, which I confess to have viewed with a jaundiced eye for most of my life, were now an integral part of my world. Our little split-level in King-of-Prussia was a refuge of peace and contentment at whose hearthstones I expected to warm myself for the rest of my days, to be carried out feet-first.

You can imagine my disorientation then, that Friday afternoon walking toward my car in the R and D Center parking lot, when I spotted Dr. Baker's antediluvian Volkswagen Beetle parked in one of the visitor's spaces.

"Ho, Woodside, old chap!" It was not an apparition that waved at me from out the driver's side window, but Dr. Oliver Wendell Baker, the most brilliant and frustrating man it has ever been my personal confusion to know.

I had not laid eyes on Baker for nearly eight years. That had been '84—when an innocent trip to an analytical chemistry conference in New York City had re-entangled me with him in an inheritance case that involved Russian spies and had nearly gotten us both killed. Prior to that I'd been in his employ for five years—my first professional job—as best boy, gopher, and test tube washer in the firm Baker Associates.

I walked over despite my first inclination to bolt and run. Unless some miraculous change had come over the man, this was not a social visit. I extended my hand numbly, smiling in front of gritted teeth. "What a surprise, Baker. It's so good to see you."

"And you, Woodside. You're looking most fit." He stuck his head out of the car window and gestured toward the building. "An impressive facility," he said. "Though in my experience most such places reduce ultimately to window-dressing for a corporation's public relations department."

You see what I mean.

"We do some things for the company," I said a little weakly. "But tell me, Baker, what brings you here?"

"As a matter of fact, I'm on my way to visit my brother in Lancaster."

I suddenly felt more than a little relieved. "Well, perhaps on your way back you'll have time to stop and have dinner with Marcia and me?"

"Ah, yes, you're married now. I recall your Christmas card last year. Actually, I'm responding to a matter that appears to be of some urgency. From his letter the affair seems to be quite serious. I, ah, thought you might wish to accompany me, for old time's sake, as it were . . . and since the case is, so to speak, in your own backyard."

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Lancaster is about 70 miles east of King-of-Prussia—hardly in my own backyard—but such distinctions could hardly be expected to carry any weight with Baker. The point was that I mentally resolved not to enmesh myself with one of Baker's cases again, no matter what.

"I'm afraid I won't be able to accompany you," I told him. "Marcia will be waiting dinner and—"

"I'm really not that unaware that you don't wish to get involved with another case like that McCluhan business, but this one is quite different, Woodside, and I thought that our former . . . relationship might carry some weight." The long, thin face turned toward the dash. "For, ah, friendship's sake, as it were—"

"Really, Baker, I'm sure you know that under other circumstances I'd be more than happy to—"

"You see it's my only sibling, Myron. A matter of personal, rather than professional concern." When he glanced up at me through the open window it was with the eyes of a long-suffering basset hound. "I was hoping to, ah . . ." A pause as he turned away again, ". . . to count on you for some support." A sniff. Baker appeared to steel himself and spoke to the steering wheel before him. "You will forgive me, Woodside. You can imagine how difficult this is."

This isn't happening, I thought, feeling my adamantine resolve transmute into something like a Hershey bar on a steam radiator. "If there were any way—" I began.

"You could, of course, call your spouse and explain the extraordinary circumstances. Perhaps the phone in the laboratory anteroom. I'm sure that she'll understand."

This is happening. "I'll just be a minute," I said, already walking hypnotically back toward the building.

"Please don't dawdle, Woodside. There's a good fellow."

Marcia's acquiescence sounded a bit forced on the phone, especially when I proved unable to provide a clear picture of how I was going to assist Baker in Lancaster or an estimate of how long my services would be needed. I confess I shaded the truth a bit by suggesting rather more of a fraternal loyalty to my former employer than I felt at the moment. But then, I asked myself, just why *was* I doing it?

I had no illusions. Baker had sculpted my emotions to achieve the desired effect with the same manipulative skill as always. And yet, even as it occurred, I realized at some dimly perceived level that I was letting it happen.

Our relationship in the years past had been mortiсed with a thin but durable layer of genuine affection, though the construct which resulted had always struck me as more than a little surreal. Baker carried his personal world with him, and though it proved quite impossible not to like him personally and to respect his formidable intellect, I was never comfortable in that fantasy into which I had been inexorably drawn. It was rather like being a personal assistant to Mickey Mouse—not particularly appropriate outside of Disneyland.

So here I was letting it all happen again. I stared about the empty lobby, amazed at the alacrity of what had been

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certainly my own decision, but not really regretting it. The last eight years *did* seem a bit lackluster in retrospect, compared, at any rate, to some of the improbable misadventures I'd had with Baker. The eight to five routine at Monash *was* decidedly devoid of the style and flare of life in the fast lane.

"No *panache* at Monash," I said to the forest of potted rubber plants.

This trip to Lancaster would be a chance to sip once again from the wellsprings of my lost youth, as it were. A foolish notion, perhaps, but it seemed that it might just prove to be the right sort of salutary balm for an incubating case of the middle-age blahs.

And, though I loved her very much, Marcia was proving to be a bit more of a clinging vine than I was comfortable with. She needed to see me in a new light—as a man of action and just a trifle unpredictable. Our marriage would be the better for it, I concluded. Though already I felt a twinge of remorse at the thought of Marcia's dining alone, perhaps watching *The Ewing Saga* on the wide-screen and picturing me in the role of the villanous male lead.

"Ah, there you are, Woodside!" It was Baker, emerging from a door that accessed an office area, a cellophane-wrapped sandwich in each hand. "Tuna salad was all that was left in the cafeteria vending machines. Rather poor security around here, wouldn't you say?" He handed me a sandwich and ushered me toward the lobby door. "Time is of the essence, old fellow. We'll just make Lancaster by nightfall."

The late October twilight cast a warm golden glow across the autumn trees of southeastern Pennsylvania. A sudden burst of wind would periodically undulate this great sea of color and sweep a snowstorm of leaves across the two-lane blacktop. We passed miles of dry-stubbled harvested farms and corncribs filled to bursting, smokehouses streaming hickory smoke and white barns adorned with elaborate hex-signs.

"There, Woodside, some things remain untouched by the impending millenium." Baker released one hand from the steering wheel briefly to point. It was a black-painted carriage with large spoked wheels, drawn by a handsome black horse. The rear of the vehicle bore a large triangular road reflector and a Pennsylvania license plate. Either guided by some unseen signal from the driver, or, perhaps, sensing our approach from behind, the horse trotted toward the gravel berm to allow us to pass. A bearded man in a stove-pipe hat waved to us as we rattled by.

"Mennonite," I offered.

"No, Amish," Baker said. "Though Jakob Ammann, the sect's founder was a Swiss Mennonite. The Amish trace their history back to the seventeenth century, while the Mennonites go back to sixteenth century Prussia."

I turned around in my seat, but we had already left the carriage behind a bend in the road.

It was getting noticeably darker now; the headlights of a farm tractor glared into my eyes from one of the fields. We drove on for a few minutes in silence.

"Myron has adopted some of their ways," Baker said at last. "Their insular, self-contained lifestyle appealed to him, I suppose."

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"I don't recall your ever mentioning your brother to me before today."

Baker gave out a mild sigh. "We haven't always been on the best of terms, to be perfectly frank, Woodside. Myron is . . . a little eccentric."

This struck me as a remarkable observation from a man wearing a double-beaked traveling cap, but I, of course, remained silent.

"There has always been some measure of sibling rivalry between us, you see, Woodside; confined, of course, to intellectual matters. Myron is every inch my equal, possibly my superior, in scientific reasoning—" I started to say something, but Baker waved away any objection. "I've long ago resigned myself to the inescapable truth of it, Woodside. My brother is a recluse, an armchair scientist, a dilettante, as it were, with no inclination toward securing a living from the pursuit of such matters. But as a practitioner of logic and as a human repository of scientific knowledge, I have yet to find his peer."

An interesting admission from Baker since I'd always perceived his ego to be boundless. "Myron is your older brother?" I asked.

"Actually we are clones."

I was taken up short by that until the realization struck me. "You mean you are identical twins?"

Baker's long, thin face remained impassive. "Why yes, of course, Woodside. What else could I have possibly meant? Don't expect any striking resemblence, however. I'm afraid Myron's sedentary lifestyle has left its mark on him."

Night had by now fallen, and the pleasant country road had developed some treacherous turns. I began to wonder just how much farther we would have to travel when Baker abruptly swung the Volkswagen down a gravel path that wound sinuously through heavy woods. Our headlamps probed the utter blackness, gleaming on stands of trees and undergrowth as we negotiated a leaf-littered trail that seemed barely wide enough for the little car. I have never regarded Baker's driving as exemplary, but now, as we hit bumps and ruts at breakneck speed and overhanging branches slapped violently at the windscreen, I felt in positive peril of my life.

I braced myself with one arm against the handhold on the dash and the other gripping the seatback; my teeth were gritted and yet chattering painfully at each impact. "Baker don't you think—"

But at that moment we emerged from the dark verdure into a moonlit clearing. A rough wooden fence stretched across our field of view, broken by the outline of a large white farm house. Lights were on in several of the windows.

Baker slid the Beetle to a heart-stopping halt amid a squeal of brakes and a shower of gravel. We stopped just inches from a fence post. He switched off the engine which coughed into submission after two dieseling chugs. "Here we are, Woodside. Myron will be expecting us."

I was a little shaky but managed to navigate all right toward the front door of the farmhouse. The fields beyond the wooden fence, I noted, had been planted with truck farm produce. At least there were pumpkins and large butternut squash near enough to be seen, their waxy rinds highlighted by a nearly full moon low in the sky.

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Baker's knock brought the sound of slow heavy footfalls and the door opened to reveal a heavy-set man with unkempt hair and a bristly mustacheless beard that encircled his lower jaw like an inverted horseshoe wreath. He was wearing bib overalls.

"Oh, it's you, Oliver," he said. "I thought it might have been Leffler again. That man is becoming a positive pest—"

Baker nodded toward me. "My former associate, Dexter Woodside.

Myron took my hand in a viselike grip. "Pleased to meet you, I'm sure," he said. The family resemblance was definitely there, I observed—the long aquiline nose and deepset eyes—though it took a moment to sink in. "Well, let's get inside," he said. "I'll make some coffee."

I was unprepared for the phantasmagoria that greeted my eyes. Myron's kitchen was littered with the most eclectic assemblage of miscellany I had ever seen compacted into a supposedly functional room. The porcelain-topped table was adorned with fist-sized rocks of various hues and textures, a jeweler's optical loupe lay among them, as well as what I took to be a brass petrographic microscope of antique design. Various mechanical devices, many with handcranks were scattered about the floor. I noticed several coffee grinders, a cork boring machine, an ice cream maker, an ancient lab centrifuge, a duck press, and no less than three static electric generators with counter-rotating glass wheels. The drainboard of the sink held jars of formalin-preserved specimens, whose more exact nature I was quite willing to forego, interspersed with dirty dishes and a test tube rack. The wrought iron gas stove was a jumble of pots and pans, where a large orange cat perched with its head and front quarters in a large aluminum vessel, licking some residue from its bottom.

Baker seemed undaunted by it all. "Leffler," he said. "That would be your neighbor, a Mr. Marvin Leffler. Your letter about his recent plight omitted many details. Perhaps you would like to start at the beginning, for the sake of Woodside here."

"Have a seat," Myron said and it was only then that I realized there were chairs in the room—wooden ladderbacks tucked tightly against the table. We pulled them out and seated ourselves amid the clutter. "It's a strange affair, that it is, Mr. Woodside. Leffler lives on the next farm south of here. That way, about two miles." He gestured with one hand and lifted the mildly protesting cat with the other, setting it gently on the floor.

"He's got a big place; grows corn, a few potatoes. A widower with no children. I would put his age at about fifty-five." Myron located a coffee pot, lifted the lid and frowned into the opening. "He's been eking out some sort of living from that land for a good many years. He's a rugged sort and hasn't let his age catch up with him yet. If his health holds out he should be able to farm that land for another decade at least."

"But the gentleman is selling out," Baker prompted.

"Right. Say, I don't think this pot is any good any more. Can I interest you both in some tea?"

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"I would actually prefer it," Baker said and I nodded agreement.

Myron rummaged in a cabinet and produced a kettle and mugs that looked relatively pristine compared to the rest of what I'd seen. He filled the kettle at the tap and set the mugs down amid the rock collection. "Leffler doesn't strike me as the calmest person I ever met—he's really sort of a Nervous Nellie type—but I never thought he'd let something drive him off his land. This whole thing appears to be too much for him. You see, about a month ago he began seeing this blue man running across his field."

I started. "A *blue* man?"

Myron lit the gas under the kettle with a wood match. "Phosphorescent blue, actually. This thing glows in the dark and only appears at night. So Leffler came to me with this story, you see, and naturally I wasn't particularly impressed. Superstition is still pretty prevalent in some farming communities, and a man living alone . . . well, you know the mind can sometimes play tricks on you." Myron tossed teabags in our mugs and pulled out a chair for himself. "I fed him a lot of platitudes and suggested he get some rest. But he was back the next day more agitated than ever. He told me that the previous night he'd heard scraping noises outside his bedroom window. He came downstairs and when he looked out the blue man was staring at him right through the window pane. The thing wore a translucent bubble over its head with the facial features indistinct behind it. The blue glow was dazzling, he said—bright enough to light up his dining room, bright enough to read a newspaper by."

The orange cat hopped up onto Myron's lap and he scratched its ear absently. "Well, Leffler panicked—screamed or yelled or something and the thing ran off. He rushed to the phone and called the police. I can imagine what they thought, but they sent a patrol car out to investigate. They combed his grounds with flashlights, but as you might expect, they didn't find a trace of anything. The poor guy was a nervous wreck the next day when he related this tale to me."

"Do you think he actually saw what he told you he did?" I was totally absorbed with the story, though secretly harboring the suspicion that Baker's recluse brother had been made the butt of a practical joke.

Myron lifted his hand from the cat's neck to scratch the pelt under his own chin. "I know he did. I've known this Leffler fellow for all the ten years that I've been living here. He doesn't strike me as the type to consciously invent a story like that, first of all. What could have been his motive, after all? No, I was convinced from the first that he believed he was seeing this apparition. But now I know that it wasn't any sort of hallucination, because I've seen it myself."

Baker had remained silent beside me throughout Myron's narrative. Now he rested his elbows on the table and bridged his fingers before his face.

"It was from a considerable distance," Myron went on, "but I definitely saw something. It happened like this: that second day Leffler wouldn't be put off; he wanted me to corroborate his story. So the next several nights I sat up with him in his living room. Nothing occurred for all that time. I just

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about had him convinced that the whole affair was the result of his own imagination. The third night, I guess it was, I decided that I'd had enough and so about two in the morning I told him I was going to walk back home. There was an occultation I wanted to watch through the attic telescope at three—''

''That would have been Vesta on October 2 at 3:06,'' Baker put in.

''Correct. So I took my leave of Leffler, urging him to go to bed and get some rest. I took a slow walk across the fields. It was pretty dark that night, lots of fast moving clouds obscuring the Moon most of the time. I'd just reached the edge of my property here when some notion made me turn and look back. In the distance I noticed a moving blue light, but Leffler's house was now behind a small rise. So I retraced my steps and from the top of a small hillock I caught my first and only sight of Leffler's blue goblin.''

The kettle began a low whistle that rose rapidly in pitch. Myron got up and poured the water for the tea. ''It was a blue man all right—just as Leffler had described. A bubble-shaped helmet of some sort, two arms and two legs, moving with a strange loping gate across the fields toward Leffler's house. I was too far away to make out any detail and the blue glow that surrounded it seemed to make the image swim in the darkness. I ran toward it but tripped on a stone. When I got up the blue man was gone. I kept on back to Leffler's place but the house was dark—he'd apparently taken my advice about going to bed and missed the appearance. The next day I told him what I'd seen and we stayed up together for two more lights in succession, but the goblin didn't appear.

''Some of the other neighbors on the surrounding farms have seen the goblin too, I found out, but descriptions and details vary. It's rapidly developed its own folklore. The local authorities have been over the area several times but haven't found any clues. I believe they're convinced now that it's some form of mass hysteria. Leffler's farm was spared any further visits by the goblin until just last week and now he claims to see the thing on a pretty regular basis. The man's nerves have been shattered; that's why I wrote you.''

Baker was examining one of the rock specimens from the scattered collection on the table. ''You have, I suppose, examined Leffler's farm for unusual footprints?''

''Of course,'' Myron said, sipping his tea noisily. ''I noticed nothing out of the ordinary at first, but the police had tracked up the ground a good bit and *they* hadn't found anything either. Then I remembered Leffler's story about the thing looking in his dining room window. Fortunately it hadn't rained since that incident and there was a flowerbed immediately below that window.'' Myron got up and opened the oven door on the wrought iron stove. ''I took an impression.'' He removed a large block of plaster of Paris and laid it on the table.

Two reversed impressions protruded from the rectangular slab. They were each roughly the size and shape of those Italian rolls used to make submarine sandwiches but striated by regular bands around the short axis.

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insect than a footprint, doesn't it?" Myron said, slamming the oven door so that the pots on the stovetop rattled.

Baker already had his pocket glass out and was examining the cast closely. "You've measured the span between the impressions?"

"Twenty-seven centimeters."

"Mm, I would have thought twenty-six. But in any event, if your goblin were standing at a relaxed position that would tell us he is rather short."

"For a man," Myron added cryptically.

"This banding is most interesting. Notice the crispness of the contour impression. It suggests something quite hard. I don't suppose you measured the compactability of the soil?"

"No," Myron said, "but it was a rich loam of loose topsoil."

"Which suggests that the blue man may not be as heavy as these deep impressions might otherwise lead us to conclude." Baker rested the frame of the glass against his upper lip so that his exhaled breath fogged the lens. "I would place his height at no more than five-seven or eight and his weight at no more than one-twenty five pounds. The banding is from a material harder than cloth or leather."

Myron drained his cup. "You're assuming a human male, of course. All dressed up and out to scare the locals."

Baker wiped the pocket lens with a handkerchief. "The footspan and depth of impression are untypical for a woman. And as to the 'human,' I am unaware of any other bipedal species on this planet that could have made those impressions."

"*Just the right phrase there, mister! Just the right phrase!*" I nearly toppled out of my chair at the strange voice. It was coming from the open window above the sink where a man's face appeared, dimly lit by moonlight between the blowing curtains.

Myron got up and hitched his thumbs in the denim straps of his overalls. "Is that you, Colonel? Well, you might as well come around in and give us your version of all this." The face nodded and disappeared. "Another of the locals," Myron said to us *sotto voce*. "Wait until you hear this!"

The kitchen door swung in and a man in service fatigues entered the room. He had a sharp featured face with darting gray eyes and a steel-gray crewcut. I gathered he was in his fifties. A plastic name tag on his khaki blouse said "Georgi." He held the ends of a riding crop in both hands and he stood in the doorframe looking from one to the other of us.

"Colonel Adam Georgi, United States Air Force, retired," he said.

"Come in, Colonel," Myron said. "This is my brother Oliver and his associate, Mr. Woodside."

Georgi nodded curtly at each of us and strode with military bearing into the room, kicking the duck press and knocking over one of the static generators.

"I take it, Colonel, that you have some theory about the local goblin," Baker said.

"No theory, sir. That remark I heard you make just now hit ground zero, by damn it did, sir! 'No species *on this planet*,' you said. I couldn't help overhearing, you understand. I was coming over to tell my good friend Myron here

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the very latest . . .'' Colonel Georgi pulled out the last of the chairs, turned it around, and straddled it to glare intently at us over the top of the ladder-back. ''*They've* decided to make contact at last.''

''They?'' Baker pocketed the glass with a final polish on his coatsleeve.

''Why yes, of course. The aliens. I take a certain pride in it all, you know. I believe they chose to show themselves here because they remember me from the Project Blue Book days.''

I took a nervous sip of tea. ''You, ah, believe the blue man is . . . from another world, then?''

''Blue *man!*'' the Colonel said contemptuously. ''It's not one, it's twelve—a scoutship. Their mother ship is moored on the dark side of the moon. There's hundreds of them there. NASA has pictures from the lunar polar orbiter, but they're classified, of course.'' He laid the riding crop across the top of the ladder-back and rested his nose on it. ''Tell me, Mr. Woodside, did you ever ask yourself why this great country of ours has delayed the establishment of a colony on the moon? Twenty-three years ago we planted the stars and stripes on the Sea of Tranquility. Almost a quarter of a century we've been sitting on our hands. Did you ever ask yourself why, sir?''

''Well, ah, I'd always supposed—''

''The *aliens*, sir. We've known they were here since the fifties. I was just a green recruit in those days, but I knew what was going on. The air force kept it all locked up tight. Tried to discredit anyone who tried to go public with it, because they knew the aliens wanted to keep a low profile and study us. They weren't sure about us and the Russkies. They didn't want to commit themselves, see, give one side the advantage of their superior technology. So we bided our time,'' Georgi sighed. ''I got to give old Ike credit. He established the policy. Give them time. Pretend they aren't there. Deny all the sighting reports and all that. In their own good time they'd realize that truth and justice were on our side. And now it's come to pass.''

Myron's orange cat was rubbing itself against my leg and purring. I shifted in my seat and glanced at Baker who was taking all this in impassively. ''I take it, Colonel, that you believe these aliens are trying to communicate with us?'' I said.

''*Believe?* No sir, I *know*. They *have* communicated. That's what I was coming over to tell Myron. I've just spent the last hour with them.'' The Colonel shrugged. ''Preliminary negotiations. Nothing substantial yet, of course. They're aware, of course, that I was involved in some of the early air force studies of UFOs. And they know I saw their scoutship land.''

''When was that, Colonel?'' Baker asked, suddenly breaking his silence.

''September 15, 4:17 A.M. Eastern Daylight Time. They told me that they have a lot of highly secret information they want to tell me. They want me to put it all down in manuscript form and have it published as a book—''

''Could you tell us about the landing, Colonel?'' Baker was in his contemplative pose once more, fingers bridged over Myron's rock collection.

''A bright light streaking across the sky. Like a meteor, only glowing green

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and dropping sparks. It came down just north of here."

"You are quite sure of the date and time?"

Georgi sat up stiffly. "You are speaking to a trained military observer, sir!"

"No offense, Colonel," Baker said. "Please go on."

Georgi suddenly looked hard at Baker, and then at me, his brow furrowed. "Is that an English accent? Look, I know you fellows were our allies in double-u double-u two, but this is a classified matter involving the security of the United States—"

Myron leaned back in his chair and scratched his beard. "He's my brother, Colonel. And Mr. Woodside is his friend. I'll vouch for both of them."

Georgi thought a moment, then nodded seriously to himself. "Good enough for me. All right, here's the poop: I'm to meet with them every third night. Secretly. It's just me and them. If I bring anyone else the deal is off. Maybe they go off by themselves for another forty years. See, time means nothing to them—they live for centuries. I've got the weight of this country's destiny on my shoulders, gentlemen. If I make the wrong move, I queer the deal."

The orange cat was in the midst of a self-indulgent orgy with my shins. I kicked at it awkwardly and was rewarded with a recriminating *meow*. "Can you tell us anything about them, Colonel?" I said.

"Well, this was only a preliminary meeting, you understand—"

"Anything."

"They're from a planet in a star system in the North American Nebula."

"Figures," I said.

Georgi squinted hard at me, but went on: "They can't breathe our air. That's why they wear those bubbles on their heads. And that blue glow—that's their protection. Come too near that glow and it zaps you: *Pssst!*" His eyes darted back and forth. "Awesome power, gentlemen! God help us if the Russkies ever got hold of something like that." Then he dismounted from the chair and slapped the riding crop against his thigh. "I've said too much already. Gentlemen, you are now privy to this nation's greatest secret. I can say no more at this time. Guard this information with your life." With that he strode out of Myron's kitchen, knocking over the duck press and closing the door with an earsplitting slam.

"Mad as a hatter," I said in the silence that followed.

Baker smiled and sipped his tea. "Perhaps."

"Surely you don't believe this preposterous narrative—"

"I didn't say that I did, you know, Woodside."

"But—"

"In investigative work one soon comes to realize that first impressions can very often be deceiving." Baker pulled out his pocket watch and flicked open the lid. "The hour is growing late. I think we should interview Mr. Marvin Leffler before anything further transpires, don't you agree?"

The moon had risen to a position high in the star-filled heavens as the three of us trudged across the dark fields toward Marvin Leffler's property. The night air was crisp and tinged with the smell of wood smoke. I half-expected to catch

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some glimpse of the phoshorescent chimera that had been terrorizing the neighborhood, but the only lights I observed were the distant glow of farm house windows lighted by wide-screens, and an occasional jet liner with its landing lights on, searching hopefully for the Harrisburg Airport.

After several stops to remove gravel from my shoes, I began to wonder just how I found myself now in the core of the Pennsylvania heartland when I could have been home enjoying a second glass of wine over the current edition of *Wall Street Week*. But it was just at that point that a large white-framed farmhouse appeared over a small rise.

Several minutes more of walking and I could make out a dark figure pacing back and forth before the doorstep. A slightly built nervous-looking man; he was unshaven and there was a look of desperation in his eyes.

"Myron, it was here again, just at sundown," he said with a cracked tremor.

"Take it easy, Marvin," Baker's brother said, putting a hand on the old man's shoulder.

"I'm goin'," Marvin said, oblivious. "I'm sellin' out tomorrow. I don't care what they give me for this place. Nothin' is worth this—"

Myron sighed. "Things will look better in the morning. This is my brother that I told you about . . . and his friend —they're sort of detective-types—" I noticed Baker arch an eyebrow at this, but he nodded and smiled at Leffler. "They're going to help us get to the bottom of this goblin thing."

The Leffler living room was neat to a fault —the antithesis of Myron's homestead. The furnishing were sparse and somewhat threadbare with age, but everything was organized and spotless. A black and white photograph of a rotund matriarch—Leffler's widow, perhaps—looked down from the mantle disapprovingly.

"Mr. Leffler, I understand you to say that the blue goblin appeared here about an hour ago." Baker had seated himself on the antique sofa next to Leffler, while Myron and I occupied two rockers across from them.

"Big as you please," Leffler said, nervously adjusting and smoothing a pillow at his side. "Wasn't even quite dark yet. I was lockin' up the barn for the night. And then I turned to walk back toward the house and there it was, watchin' me from out by the line of trees. Just standin' there, watchin'."

"And what did you do?" Baker asked.

"Why, I let out a yell, of course."

"And . . ."

Leffler wiped at some imaginary dust on the sofa arm. "Well, this time it just stood there. The other times a yell like that had always got it runnin'. But tonight it just waited there, like it was showin' me it wasn't scared none. And you can believe me, my blood run cold. And for a while we just stood there lookin' at one another. And then—"

"Yes?"

"And then it started walking *toward* me, defiant like. It was so bright it lit up the grounds all around it. I run to the house and locked the door. I was breathin' so hard, I like to have a heart attack. It took till just a few minutes ago to work up my nerve to open up and look out again."

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Baker pulled at his lower lip, studying the nervous man's face. Leffler, for his part, appeared unable to look directly at any of us. "Did you note the exact time of this last appearance?" Baker asked him finally.

"No. Well, yeah, the hall clock was chimin' just as I slammed the front door. That'd make it seven o'clock."

Baker looked at his pocket watch. "Nearly an hour ago. Mr. Leffler, after securing the front door, what did you do next?"

"Locked the kitchen door and all the windows. Then I run upstairs and looked out the attic window. I got guns in the attic."

"Indeed? And was the goblin still approaching the house?"

Leffler adjusted the position of a Chinese ginger jar on an end table next to the sofa. "Nah," he said. "It was gone. Just like the other times."

"And how many times, all told, has the goblin appeared on your property?"

"Six. No seven, now, I guess."

"And never more than one appearance on any given night?"

Leffler removed the lid of the ginger jar and peered inside. "No, not so far," he said, replacing the lid with trembling fingers. "But I don't expect the thing's on no schedule. You fellows bein' detectives and all . . . you might want to stay the night here. It could be back any time—"

Baker nodded thoughtfully. "I was just about to suggest that, Mr. Leffler. Perhaps we could arrange some sleeping accommodations here in your living room? For myself, I find that I can do quite well with an hour or two in situations like this, but Woodside and Myron might wish—"

"Now, hold on, Oliver," Myron said, "I don't see very much point in the three of us—"

"Really, Baker, I'm sure Marcia will be expecting me back home tonight—" I protested.

Baker stood up with a pained expression on his face. "Gentlemen, you both surprise me. I have an investigation in mind that cannot be conducted without your services."

"Can't it wait until morning?" Myron said.

"Most decidedly not. Every moment we delay may make our task more difficult. Mr. Leffler, do you have a phone?"

"Sure, on the kitchen wall, back on through there."

"Good. Now, Woodside, be a good chap and explain the situation to your wife. Mr. Leffler, do you keep hydrogen peroxide in your medicine cabinet?"

"Peroxide? Yeah, I think I got some."

"Fetch it, if you please. And, Myron, if you have some of the more concentrated reagent back at your home, that will be most useful as well . . ."

I've already alluded to Baker's persuasive powers. Somehow, within moments, and without any further protestations, we were set in our respective tasks. I found myself dialing Marcia with still no clear idea of what sort of evening it was going to be.

Marcia claimed to have fallen asleep after dinner and even feigned a yawn into the phone, but I knew my wife too well to be taken in by her languid insouciance. One does not cohabit with

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a person for a year without gaining some empathic perceptions about them. When I announced, falteringly, that I'd be spending the night goblin-hunting in Lancaster her mask of bored indifference slipped just enough to suggest a curious blend of Mary Poppins and Medea.

"Why don't you call your mother tonight and have a nice long talk," I told her, knowing full well who would be the topic of that conversation. "I'll probably be home before you're up in the morning. We'll have breakfast and go shopping at the Mall." While I am by no means an expert in these matters, I did know that few things are as effective in assuaging feminine wrath as the prospect of buying clothes.

We signed off with a tender exchange, even though her part sounded somewhat forced. I was standing there in Leffler's kitchen, the phone receiver still in my hand and wracked by conflicting feelings, when Baker entered with a spray bottle of widow cleaner which he proceeded to dump down the sink.

"Just the thing, Woodside," he said, rinsing the bottle under the tap. "See if you can find three more of these. Any kind of sprayer will do . . . and a flashlight with a strong beam if there is such about."

I set the phone back in its cradle. "What on earth for, Baker?"

"A calculated hunch. Perhaps you might try down in the basement there. And hurry, Woodside; we are pressed for time."

With Leffler's help I located two old-fashioned flit-gun sprayers and a perfume atomizer from his late wife's keepsakes. I also discovered an old Ray-o-Vac with good batteries. By the time we emerged with these, Baker had filled the window sprayer with Leffler's supply of hydrogen peroxide and was giving it an experimental spritz into the sink. "Excellent," he said, observing our finds. "And that will be Myron at the door." A second later the front door slammed and Myron appeared with a chemical reagent bottle.

"Fine," Baker said. "A bit strong for our purpose. I'll just dilute it a bit with tap water and we'll have enough to fill the other three containers. A seven percent solution should do nicely."

Baker passed out the filled sprayers and directed us to follow him outside. We were marching out into Leffler's furrowed fields when I stopped him. "Baker," I said, "I really think you should give us some idea of what this is all about."

"Why, I think it should be obvious, Woodside. We're looking for the trail of the goblin." With that he proceeded to spray the ground in front of him as he walked. We all stopped and watched him. Baker looked up. "It would be most judicious to cover the area systematically," he said. "I suggest we fan out in four directions from this spot until something is uncovered."

We did as we were bid, spraying the plowed earth as we stumbled through the moonlit field. I had no clear idea of how this activity was intended to reveal the goblin's passing. About fifteen minutes transpired in this manner and my forearm had already begun to grow sore from pumping the flit-gun, when Leffler gave out a shout. "It's a-glowing!" he said.

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The rest of us rushed over to where Leffler stood quivering before a pool of dull blue light. Baker hunched down and sprayed the glowing soil with his atomizer several times. Instantly, the phosphorescence brightened, bathing the four of us in its glaucous radiance.

"It's luminol," Myron said, contributing a spritz from the window cleaner bottle.

Baker nodded, "Technically, 5-amino-2,3-dihydro-1,4-phthalazinedione in basic solution. The earliest chemiluminescent compound, first studied by Albrecht in the late 1920s. Rather low quantum efficiency, as I recall, but relatively cheap and readily available."

"And the source of the goblin's glow," I said. "So by spraying with hydrogen peroxide we can follow its trail—"

"Just so, Woodside; though the compound will break down from contact with the soil. We must move quickly. This atomizer is running a bit low. If you would lead the way . . ."

I took up the task, spraying the earth to generate a formless line of glowing smudges, with the rest of the party following at my back.

"This ain't natural," I heard Leffler say from far in the rear.

"No, Mr. Leffler," Baker offered. "It's a synthetic compound. The quantum efficiency of firefly luciferin, for example, is much higher—somewhere in the 75 to 90 percent range."

"I knew it wasn't natural," Leffler said, missing the point by a wide mark.

My lower back was getting sore. I glanced back and noticed that the glowing trail was fading quickly behind us.

"Note that no footsteps or other distinguishing features have emerged," Baker was saying. "The diffuse blotches suggest the compound is dispersed as some sort of delocalized aerosol."

By now we had come several hundred feet, inching along in a tight group. My back was killing me. I straightened and begged off by virtue of an empty flit gun. Myron then took up the lead and I continued, somewhat more comfortable, as a spectator in the back of the crowd.

After several more minutes the glowing trail abruptly ended. Myron sprayed in several directions, but to no effect. The glowing path that we had been trailing was fading rapidly under our feet and within another moment we were standing in the darkness.

Baker peered at the line of moonlit trees that edged Leffler's property, perhaps fifty yards away. "We appear to be at an impasse," he said, "though I believe we have learned a great deal." He turned to Leffler who stood next to him, scratching his thinning hair. "Mr. Leffler, if we were to proceed in a straight line through the wooded area at the edge of your property, where would it lead?"

"Oh, them woods are thick back through there. Sort of irregular patch they left when they cleared land for all these farms. It fronts on a lot of people's property hereabouts—"

"Mm. Nothing else?"

"Oh, if you go all the way, there's a dump back there, watcha-call, a landfill. Gring's Mill Landfill, I guess it is. When the air's right you can hear the trucks dumpin' their loads sometime all the way back here."

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"Interesting," Baker said. "Woodside, did you bring the flashlight?"

I handed it over. "You're not suggesting that we search those woods in the middle of the night?"

Myron spoke up. "Oliver, surely our goblin has gone to bed for the evening and I suggest that we all do likewise."

"I wouldn't mess in them woods at night," Leffler said, the tremor returning to his voice. "There's been stories of wild dogs back in there."

"It's just possible our goblin may be using the cover of those woods to gain access to your property, Mr. Leffler. I really think they bear investigation." Baker clicked on the flash to try the beam. "However, I believe Woodside and I can handle this phase of the study. Perhaps you and Myron should return to the house and get some rest."

"A capital suggestion," Myron said. "However, I recommend caution, Oliver. Those woods are deep and one can get lost fairly quickly. I don't know about the wild dogs, but those trees provide ideal concealment for someone who wants to spring out unexpectedly. Are you armed?"

Baker sniffed mildly. "I hardly think we'll be in any danger. I suggest you put such thoughts of an ambuscade out of your mind and enjoy some sleep."

Despite Baker's confident assurance, I felt a sharp twinge of apprehension at Myron's warning for I knew that Baker made it a matter of principle to carry no weapons, and I most certainly was not "packing a rod," in the street parlance, never having fired a gun in my life.

We bid a hasty farewell to Myron and Mr. Leffler and, as they headed back toward the distant comfort of the farmhouse, Baker, undaunted, led the way to the woods. In minutes we were enmeshed in a labyrinth of trunks, Baker's flashlight beam probing a path through the dry undergrowth. I followed, reluctantly, several paces behind. The October air seemed to me to have taken a sharp turn, the windbreak of the trees seemingly offering no protection from the chill. I suppressed a shiver and closed the distance to Baker's dark form. Our cautious footsteps were accompanied by the crunch of fallen leaves and the soft snapping of twigs.

"See here, Woodside," Baker said, stopping abruptly, so that I nearly ran into him. His flashlight beam was focused on a notch cut into the bark of a massive tree trunk. "A signpost of the trail, no doubt."

"Are we following a trail?"

Baker turned; his voice was quite near and held a trace of disappointment. "An evident path of disturbed ground clutter, of course. Really, Woodside, did you think we were wandering aimlessly in the dark?"

"Well, I—"

"Do you still have the insect sprayer? Pass it here a moment."

I handed Baker the nearly-empty flit gun and he extinguished the flashlight. There were several loud hisses as he worked the pump in the total darkness. A faint smudge of blue appeared to swim in the air where the tree notch had been. It quickly faded. "That's very odd," Baker said and clicked on the flash.

"It appears our goblin used that tree notch to correct his path through the forest," I said.

Baker was scrutinizing the tree trunk.

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"Perhaps so, old fellow, but not tonight, I don't believe. That trace of luminol was quite spent compared to the residue we saw in Leffler's field. Interesting." The flashlight beam darted along the scattered leaves. "Note the disturbed pattern leading off in that direction. This is quite evidently a route used on repeated occasions—"

Just then there was the distant growl of a diesel engine that made me start so violently that I nearly lost my balance. "The Gring's Mill Landfill, Woodside," Baker said, calmly, steadying me with a hand on my shoulder. "Some local refuse hauler is apparently working late."

"Sorry," I said, having gathered my composure.

"Are you quite ready to continue?"

"Yes, I suppose so."

"Well, then I suggest we . . ." Baker hesitated, suddenly snapping off the flashlight, so that once again we were plunged into complete darkness.

"What is it?" I asked, a shudder running down my spine.

Baker's voice came in a whisper. "Someone's moving through the trees."

I swallowed with difficulty, staring into the utter blackness and straining my hearing. A tense and complete silence followed as we stood immobile, waiting. And then: a distant rhythm of rapid footfalls coming from directly ahead.

We waited a long moment as the sound approached, accompanied now by the snapping of branches. Then suddenly I saw two luminous globes of white light bobbing at eye level between the interstices of the dark foliage.

The lights floated past us, some tens of yards ahead, at an oblique angle to our position, and following each other closely. The sound of running movement was accompanied by the sway of back-lit branches in their wake, I heard a muttered utterance, but it was in no language I could recognize.

Another moment and the light and sound were gone. "Interesting, wouldn't you agree?" he whispered. "These woods seem to be more regularly frequented than is generally recognized. I propose that we follow this target of opportunity for the moment." And already he was moving quickly in the direction that the lights had been traveling.

I struggled to keep up, for Baker, despite his languid, deliberative aspect, was capable of a remarkable degree of exertion when the occasion arose. I concentrated on the flashlight beam to keep my bearings and extended my arms to circumvent any unexpected collisions with tree trunks and low-hanging branches. In spite of these precautions, I was slapped and battered by the dark limbs of trees and I stumbled and tripped repeatedly in my efforts to keep the pace. Baker, for his part, seemed to be tracing a path though the woods with all the effortless skill of a deer-stalking aborigine.

Minutes later, Baker's hand on my chest brought me to a panting halt. Our targets were within sight and that vision brought a stifled gasp to my throat.

In a small clearing two white-suited figures stood conferring. They appeared small of stature and humanoid in general outline, but the cumbersome-looking suits covered their bodies completely. They wore visored hoods, surmounted by something like a miner's lamp: the luminous globes we had seen. I could

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see nothing of their features through the dark rectangles of the visor plates. They both seemed intent on a small object—something metallic with several projecting wires—which one of the pair held in a gauntletted hand.

"My God, Baker!" I whispered.

I heard Baker's characteristic sniff, which had always served as a prelude to some audacious and hastily conceived action plan. He patted my shoulder and without a word stepped out into the clearing.

"A pleasant evening for a stroll in the woods, isn't it?" He spoke so loudly that even I jumped at the sound.

The effect on the hooded figures was precipitous. The spotlights swept toward Baker and then swung wildly. They crashed into one another in their confusion and both figures nearly toppled. Then they were running madly into the tree cover. In another instant they had dissolved into the forest.

Baker walked out calmly to where the two had stood a moment before and picked up the metal object that they had dropped in their flight. He was examining it under the light of the flash when I summoned my wits enough to join him.

"Good heavens, Baker," I managed to say, "what can this all possibly be about?"

"I would say, Woodside, that Colonel Georgi is correct in at least one respect . . ." He was turning over the oddly shaped object in his hand. "There appears to be a surfeit of goblins in the neighborhood."

I awoke with the bleary impression that I had heard a rooster crowing and wondered dimly if Marcia had turned the television on. It was only after nearly rolling off Leffler's sofa that I realized that the sound was not from some Saturday morning cartoon show but had emanated from a source that was all too real.

I opened one eye and was greeted by the sight of Baker in his bridged-fingered contemplative pose in one of the rocking chairs. On the coffee table before him was the metal object we had acquired the night before, and next to it, a small rock of an unusual light beige hue.

I closed my eyes and rendered a silent but heartfelt sigh. Already I was beginning to feel the aches and pains and cuts and bruises that were the legacy of last night's tramp through the woods. We'd doubled back, I remembered, in an effort to regain some sign of the original goblin's trail (I was already beginning to think in terms of blue and white goblins), but the effort proved fruitless. Several hours more had been spent scouring the forest at random for further clues, but nothing more had presented itself. Finally, mercifully, the flashlight batteries had begun to falter, and we'd made our way back to Leffler's farm well past midnight.

Something bizarre was clearly afoot here, I knew, but in the cold light of morning I seriously questioned whether I cared to find out what it was. My beleaguered middle-aged body appeared to be telling me that this dose of Oliver Wendell Baker had been quite enough to last me another eight years. At any rate, I told myself, I'd promised Marcia to take her shopping today.

I opened both eyes this time and, of

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course, Baker hadn't moved. But this time he spoke: "Decide to join the world of the living, Woodside?" It was uttered absently, his gaze never leaving the two objects before him.

"What time is it?" I asked, struggling to prop myself with an elbow.

"Near seven. Mr. Leffler is about his morning chores, though he still appears badly shaken. Myron claims that those two propped chairs were not conducive to sleep, so he's off to his own bed to remedy the matter."

"And you've been up in that rocker all night?"

"I caught a wink now and again. I was out at the crack of dawn for a little daylight surveillance, however."

I focused on the objects that still commanded his attention. "Where did the rock come from?" I asked.

"From Leffler's pasture. It caught my eye. Myron has one quite like it, I noticed—he tells me he collected it in this general area."

I sat up, still groggy. "You think it might have some significance, then? And what have you made of that metal thing?" Now that I saw it in good light, it reminded me of a partially melted wire whisk of the sort Julia Child uses to beat egg whites.

Baker nodded. "Both the rock and the metal seem extremely light. Unusually so. I believe an analysis is called for."

I picked them both up and hefted one in each hand. I had to agree they both seemed of low density. I noticed out of the corner of my eye that Baker was now studying me with the same attention he'd devoted to these artifacts. "I suppose you have a passkey at Monash," he said after a time.

I started to protest. "The company frowns upon unauthorized use of equipment—"

But Baker was talking right over me: ". . . They have some sort of vacuum direct reading optical emission spectrograph. And X-ray diffraction equipment, I suppose—"

Then a new thought struck me. "Of course, the watchmen all know me. I could get you set up to run the analysis and then take my car home from the lot. I promised to take Marcia shopping at the Valley Forge Mall today—"

"It sounds like an excellent plan," Baker said, apparently oblivious to the fact that I'd just wangled a ride back to familiar territory and an exit route from any further entanglement with the case. "I suggest you get dressed promptly and I'll see if Mr. Leffler will prepare us a light breakfast before our journey." He stood up and grinned wryly, generating some doubts in me about my own cleverness. "A little alacrity is called for, Woodside," he said. "Twelve hours have passed and a host of questions still abound."

I was silently thankful that I saw only the security guards' cars parked in the Monash lot. On the trip down I had been troubled by visions of explaining Baker to some front office type who had picked this Saturday morning to log in some brownie points with weekend overtime. Mort, the morning man, hardly glanced up from his newspaper as Baker and I signed the visitor's register and clipped on our plastic badges. The "Baker Associates" that had been en-

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tered next to "O.W. Baker" seemed obscure enough so that I could pass it all off as some sort of emergency instrument repair if I was questioned on Monday.

We took the elevator to the second floor and I unlocked the spec lab and clicked on the lights.

"Ah, just as I suspected," Baker said, glancing around at the equipment. "Speed, but no versatility. This, I'm sure, is all meant to be very impressive for guided tours through the laboratory, but I hardly think that Fraunhofer or Angstrom would have found it of much use . . ." He walked over and patted the arc stand on the direct reader. "You create a luminous plasma from your sample with a hundred thousand dollars worth of sophisticated high voltage circuitry; you disperse the slit image of the light with a diffraction grating which is itself a miracle of the art of fine optics . . ." He waved his hand in disgust. "And then you throw away 99 percent of the spectrum and pick off a few selected lines with carefully placed photomultiplier tubes."

I had to smile. "But we read those lines very well," I said. "And this unit has 40 element channels."

"Mm, I suppose that's meant to engender awe. And what does one do if a major component of his sample is not one of the forty. There are 114 now, you know, Woodside."

I suppressed a chuckle. "When you consider stable room temperature solids and eliminate the transuranics, I think those 40 have things pretty well covered." I motioned toward the antique Jarrell-Ash unit against the wall. "And for anything really rare we can still do photographic plate work over there. Of course, we don't use it much any more—"

Baker's long face brightened. "Ah, the classic three-meter Ebert mounting. That's for us, Woodside." He walked over with a bouncy step and examined the controls on the source unit. "We'll reduce the rock in a mortar and arc it in a crater electrode. A piece of the metal can be sparked in a Petrey stand." He removed his coat and cap and draped them over a chair. "Where's your darkroom? I'll begin loading the photographic plates, while you undertake the sample preparation—"

It was characteristic of Baker that he would opt for the classical, most rigorous and tedious approach, I thought, watching him roll up his shirt sleeves. "I really think we should at least have a look at the samples with the direct reader first," I said. "The whole analysis will only take a few minutes."

He stopped and looked at me, his hand still on his half-rolled sleeve. I watched the pensive brow relax and he smiled. "You are right, of course, Woodside. A preliminary survey at the very least with that automated monolith. I confess that I find black boxes of whatever size objectionable in principle, freeing the mind of the operator, as they do, from the intervention of any analytical thought. However, in this case I must yield to the efficacy it provides. . . . All right, then, offer our samples to that delphic automaton and let us see what oracular prophecy issues forth."

I loaded the disk-pack interelement correction program and keyed in some initialization parameters, having di-

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rected Baker to our sample preparation area in an adjoining room. It was mildly amusing to see him in the role of gopher for a change. By the time he emerged I had "profiled" the instrument with drift correction standards and we were ready to begin the analysis.

The rock sample was first. While the arc discharge filled the room with its high-pitched buzz, I observed Baker's expression of resigned distaste for the stylistic impropriety of this "black-box" analysis. When the source shut down, perhaps a full second of silent cybernetic thought was followed by the faint whirr and thump of the line printer.

Baker nodded at the printout. "Is there some problem, Woodside?"

"Not that I'm aware of," I said, tearing off the sheet and handing it to him.

He looked at me a bit forlornly, then down at the page in his hand. I peered over his shoulder:

```
RUN
ID: 0001                BURN: 0030 SEC      CORRECTION PACKAGE: 99A
PREBURN: 0010 SEC

 C     MN    P     S     SI    CR    NI    CO    FE    CU    V
0.001 0.010 0.002 0.003 24.91 0.100 0.040 0.101 1.97  0.010 0.000

 TI    AL    B     NB    TA    W     ZR    HF    RE    PB    SN
0.470 17.63 0.001 0.001 0.000 0.000 0.000 0.000 0.000 0.001 0.002

 AG    BI    NA    K     LI    CA    MG    SR    CS    RB    PT
0.000 0.000 0.950 0.140 14.04 0.610 0.340 0.000 0.000 0.000 0.000

 RH    OS    PD    AU    CE    LA    PR
0.000 0.000 0.000 0.000 0.000 0.000 0.000

ENDRUN
EXIT
```

"One can place too much faith in this sort of thing, you know," he said after a bit.

"I'll wager it's close to the truth, even without a closely matching standardization," I told him. "It would have taken more than a full day to get anything similar by photographing the spectrum and measuring the optical density of the emission lines with a microdensitometer."

"On the other hand," Baker said, "one could detect the presence of all major components—including those for which your oracular machine is not programmed—by a cursory scan of the photograhic plate."

"True," I said, "but it's unlikely that anything major is unaccounted for. The balance of the composition is undoubtedly oxygen."

"Undoubtedly, Woodside. Well, let's have a look, then, at this strange piece of metal."

A minute later Baker was holding a

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second printout sheet in his hand. "A nickel-titanium alloy," he said, studying the numbers. "It appears to be of a sort known commercially as Nitinol. This is interesting, Woodside, most interesting."

I was looking at my watch. "It's nearly ten-thirty, Baker. I really must call Marcia and tell her I'm on my way home—"

"—Of a class generically called shape-memory alloys," Baker was saying. "A part is formed from the alloy and subjected to a specific heat treating cycle. After that the part can be deformed and mild heating will bring back the original shape. Our specimen here, though, appears to have been subjected to very extreme temperatures—"

"If you'll excuse me, I'm going to use the phone in the office to call her—"

"Oh, ah, Woodside," he said, looking up from the computer form.

I had nearly made it to the hallway door.

"The implications of these analyses are far-reaching. They account for our three goblins quite neatly, I believe."

"They do?"

Baker nodded. "Only some details remain to be elucidated—"

"Well, ah, congratulations, then, Baker. The case appears to be well in hand. Now, if you'll pardon me, I'm certain Marcia is becoming anxious—"

"—For which I'll require your expert services in Lancaster—"

I felt my face flush. "Quite impossible, Baker," I said shaking my head vigorously. It was time, I decided, for explicit frankness. Marcia would be furious if I allowed myself to be dragged back. "You must forgive my bluntness, Baker, but you don't appear to appreciate how my wife must be reacting to my already prolonged absence from home. While you are in most respects a very discerning analyst, the makeup of the female personality most definitely eludes you."

"On the contrary, Woodside, I must disagree with you. Even though I have personally eschewed nuptial ties, I have made a detailed study of the manifold psychological relationships involved therein. Therefore, I suggest we make haste to your home, where I will explain the matter in detail to Marcia."

Inwardly, I felt as one does when one rolls one's eyes at the bombast of a particularly fatuous pedant. Baker, I was sure, had no realistic ideas about women or marriage. And if he thought he could convince Marcia to forego her shopping spree with a showering display of logical arguments, or get her to agree to give up her husband for another day of goblin chasing in Lancaster with persuasive charm. . . . Well, it would be amusing to watch at any rate.

"Shall we go, Woodside?" Baker said, his coat already on, adjusting his traveling cap.

I was still looking at Baker with dismay as he backed the Volkswagen out of my driveway and tooled it past the leaf-littered lawns of the Philadelphia suburb.

He must have noticed my knitted brow in his peripheral vision. "Something on your mind, Woodside?"

"It's nothing, Baker . . . I just never imagined Marcia would go along with something like this. You not only convinced her to give up her shopping trip,

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you actually have her doing library research on the case."

"It's just a matter of motivation, old fellow."

"I'd say you displayed a considerable degree of manipulative skill in the matter." He'd charmed the socks off her, is what he'd done. I hadn't seen Marcia blush at compliments like that since that waiter with the French accent at *Le Bec Fin*.

" 'Manipulative' is hardly the word, Woodside. Your wife is an intelligent, sensitive woman, which I sensed immediately. I merely told her the truth about herself. Intelligent people tend to respond positively to the truth. Involving her, however obliquely, in the investigation would naturally tend to ameliorate the isolation she would feel while you and I were engaged in this second stage of field work. And beyond that, the literature search she'll be conducting at the local library is absolutely essential to the final phase of the investigation."

Perhaps, I thought. But I'd seen that far-away, star-struck look in Marcia's eyes and was gaining an entirely new level of respect for Baker's powers.

We turned onto the Schuykill Expressway and traveled the short ride north toward the Pennsylvania Turnpike in silence. Traffic was unusually light outbound from center city, but the inbound leg on the other side of the medial barrier was already clogged with turbovans and passenger cars. At the turnpike ticket booth the attendant smiled and said, "Nice costume," as he handed over the punched card. I noticed that Baker held a full-bent licorice pipe between his teeth as he tucked the turnpike ticket into an inner pocket.

Baker rolled up the window and we sped away back toward Lancaster.

It was some minutes later that I realized tonight was Halloween.

We arrived to find Myron loading a pickup truck with pumpkins to deliver to a local cannery. Some of them were monstrous things, fully half a meter in diameter. Baker questioned his brother about the rock specimen on his kitchen table that was similar in appearance to the one we had analyzed that morning.

"A unique form of quartz, I guess it is," Myron said, heaving one of the massive pumpkins over the tailgate. "They're all over Leffler's property. I even noticed a few on my own grounds. Leffler told me the other day that he'd had some local lab assay them—I guess he figured they might have some value since they're such odd-looking things." Myron leaned against the truck and wiped sweat from his brow. "But it seems they analyzed out as common stuff. He showed me the report: silicon, aluminum, a few traces of alkali metals—"

I started to speak, but Baker raised his hand. "What was the name of the laboratory that performed the analysis?"

Myron scratched his beard. "Lititz Testing, I guess it was. That's only a little ways from here. They're small. They mostly specialize in soil and water analysis. But they've got some pretty modern equipment so I don't doubt that they did a good job."

Again I started to protest, but Baker ushered me back toward the Beetle. "I believe Woodside and I will pay

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them a visit. Are they in the town of Lititz?"

"Sure are," Myron said, hefting another pumpkin. "But you'll find them closed today. Just a minute, I think I have a local number you can call." He put down his burden and began walking toward the house. "I heard that sometimes they'll open up for a special job. You might try it. . . . By the way, Oliver, what's this all about? You think those rocks are made of gold or something?"

Lititz Testing occupied a converted mansion that belonged to the nineteenth century. As we stepped onto the decaying porch, I got the distinct impression that I was walking into a gothic novel. And looking over at Baker's detached calm, I decided that I was at least in the right sort of company.

Our ring at the bell was answered by a creak of floorboards from within and in a moment a cadaverous-looking old gentleman appeared at the door. He wore suspenders over a wrinkled white shirt and a prominent adam's apple bobbed over a clip-on bow tie. "Can I help you?" he said.

"We called an hour ago," Baker told him, introducing us both.

"Got yerselves a hot sample, do ya? Well, we don't do this regular, no sir. Saturdays we're closed. But anyway, come on in and I'll see what I can do for ya."

"We're most grateful," Baker said as we entered what had once been a large Victorian living room. A desk and several lab benches had been installed against wainscotted walls; an incongruous fluorescent light fixture hung against the ceiling. And, most startling of all, an optical direct reader, complete with computer terminal, stood in the middle of the hardwood floor.

"Name's Mason James," the old man said. "I run the place with some help from some local kids. We do a lot of work for the water authority and the farmers hereabouts. Some small foundries and cement plants throw some work our way from time to time. It's a mixed lot of stuff, so we've got to be set up to handle just about anything." He rubbed his hands together. "Now, what ya got for me?"

Baker reached into his coat pocket and removed the beige-colored rock sample. He held it out for Mr. James to examine.

The old man frowned. "That looks familiar."

Baker nodded. "You analyzed a similar specimen for a Mr. Marvin Leffler."

Mr. James had been about to pluck the sample from Baker's outstretched palm. Now he curled his fingers back and worked his thumb over his nails. "Wasn't nothing special, as I recall," he said. "Yeah, it turned out to be pretty much of a common rock." The old man's manner seemed to change perceptibly. He cleared his throat and coughed. "Now that was a 'best-effort' job, just like I said in the report. If you fellas want to see the print-out from the DR I can find it for you. We report what we get out of the machine on something like that—"

Baker juggled the rock and smiled warmly. "Let me assure you, Mr. James, we're not from some agency checking your laboratory's accredita-

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tion . . . Mr. Leffler is selling his farm, you see, and, since the group we represent has some slight interest in the property, we were asked to make a quick evaluation of the soil properties. Frankly, our report so far has been quite negative, but these unusual-looking rocks seem to represent an anomaly. We'd merely like to have the analysis repeated to verify your results."

Mr. James peered at Baker and then at me under bushy gray brows. I maintained a solemn deadpan, while Baker continued his friendly grin.

"It's goin' to cost you. Two hundred. It bein' Saturday and all—"

"I'm sure that will be fine," Baker said.

The old man hitched a thumb in his suspenders and extended a bony hand. "Give it here, then, and call me about five. I'll have the results for you."

Baker handed over the small rock. "If you don't mind, we'd like to watch."

Mr. James set the rock down on a lab bench as if it were hot. "That don't go around here," he said.

Baker furrowed his brow. "Naturally, if there's some reason you'd rather work alone, we'll leave. It's just that Mr. Woodside and I have never seen a facility like this and we were understandably curious as to how this sort of work is performed."

I took that as a cue. "Is that big machine what they call a spectrograph?" I asked.

Two hours later we were in the car headed back to Myron's farm. The computer printout sheet was in my lap and I was staring at the results in disbelief.

"You appear to be perplexed," Baker said, "You're not losing faith in those black-box behemoths, are you, old fellow?"

I shook my head. "I watched him carefully, Baker. Instrument profile, calibration, check standards—his technique was flawless. Unless there was something in the computer program . . ." I waved the paper. "This says the stuff is worthless rock."

"Instead of high-grade lithium ore, as our analysis at Monash indicated?"

"We couldn't have been that far off. . . . Unless there was some unknown line interference. . . . I'd have to check the *MIT Wavelength Tables*, but—"

Baker swung the Volkswagen through a hairpin turn. "No, Woodside. It was Mr. Mason James who generated the erroneous data—and quite deliberately."

"But I don't see how."

"A very clever deception. Mr. James is quite a bit more subtle and intelligent than he might have appeared to you. I observed that while he was mounting the sample in the arc stand, he slipped a small but powerful magnet in with it—one of those cobalt-rare earth types, no doubt."

I looked at Baker quizzically, and then the implication registered. "The Zeeman effect!"

"Precisely, Woodside. The old gentleman knew just how to place that magnet so that its intense field would permeate the arc plume from the sample. The emission lines were all split into a complex hyperfine structure. And lithium—with its two stable isotopes —simply divided into two lines which slid away to either side of its precisely

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aligned photomultiplier slit. The rest of the element spectre were distorted as well, of course, but the calculated results still roughly resembled the assay of a worthless mineral."

"Surely, this fellow, James, didn't work up this ploy on the spur of the moment for our benefit?"

"*Undoubtedly not, Woodside. It* would seem that some little thought has gone into falsifying geochemical data for the surrounding farmland. Evidently a plan has been hatched to ensure that the local landholders remain ignorant of the fact that they are sitting on the richest known deposit of lithium ore."

I scratched my hairline and studied the stubble of cornstalks as we raced past. "I never really thought of lithium as a valuable commodity," I said. "I take it you believe that our three goblins are tied up somehow in a scheme to scare the locals into selling off their land?"

Baker's face grew serious. "There are still a number of unanswered questions, to be sure . . . But you're right in a sense, Woodside—until very recently the market for lithium metal has been comparatively small. It's used as a metallurgical inoculant in certain nonferrous castings, for example; and there are certain defense-related applications—" Baker took a deep breath and I sensed an impending monologue. "The metal is obtained electrolytically from salts produced from the acid digestion of ores that range from one to eight percent of the element—spodumene, lepidolite, and amblygonite.

"But the emergence of magnetic confinement fusion technology will shortly revolutionize the economic picture. Last year's demonstration of scientific breakeven at the new Princeton torus has started the electric power industry buzzing with engineering design standards for the first generation of commercial fusion power reactors. Lithium metal appears to be the prime candidate for use as the primary coolant in those designs. Its low melting point and high boiling point are in its favor, as well as its excellent heat conductivity. In addition, it will breed tritium in the heavy neutron flux from the plasma which can be extracted and recycled as fuel." Baker removed another licorice pipe from an inside pocket and licked the stem thoughtfully. "Like so many other unique design features of these future fusion reactors, there is no current in-place industrial capacity to produce the required material in the forms and quantities that will be required. An examination of recent securities trading suggests that recently several large companies have decided to attempt to corner niches in these new, potentially lucrative markets. A secure source of ultra-high grade lithium ore would command a king's ransom from one of the corporations which are poised to capture the lithium trade."

Baker tapped his lip with the candy pipe. "But as to our goblin, I'm afraid the situation remains a bit muddled—"

"How is that?" I asked. "The goblins must be in a conspiracy with this Mason James to drive off the farmers, buy their land, and sell the mineral rights to some conglomerate. As you would say, Baker: *'Quod Erat Demonstratum.'* "

Baker frowned. "It's all a little *too* obvious, Woodside. And then, for one

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thing, there is the matter of the nickel-titanium artifact. And, for another, goblins shouldn't come in two different colors—''

Baker dropped me off at Myron's farm with the instructions to await Marcia's call with the results of her library search, then he buzzed off mysteriously on his own, indicating that he would return at dusk. To my dismay, I found Colonel Georgi sitting in one of the kitchen chairs with his boots up on the table amid the rock collection. Myron was at the stove preparing dinner.

''Woodside, is it?'' Georgi said. ''Sit down, you'll want to hear this.''

I took a seat a bit hesitantly and noticed Myron arch his eyebrows at me, then glance toward the Colonel. ''Something new, is it?'' I asked.

''Hot off the presses, sir. I had another pow-wow with our friends out there last night.''

''I, ah, thought your next . . . pow-wow wasn't scheduled for another three days?''

''What? Oh, right. Well, this was too big to hold. They called me on the phone.''

''The goblins?''

''Aliens. Look, there isn't much that's beyond them. Tapping into the Conestoga Bell lines is nothing to them. Now listen tight—they spilled their grand plan. And let me tell you, it's *big*.''

The orange cat had the temerity at that point to jump up on my lap and yawn at me. ''Can you, ah, reveal the details?'' I stifled back a yawn myself, marveling at the ignomity of this example of the power of suggestion.

Georgi took his feet down and squinted those beady eyes at me. ''Once I trust a man, I trust him all the way. But heaven help him if he lets me down—''

I shooed the cat back to the floor. ''I'm certain, Colonel, that no one here will let you down.''

Georgi started to look away, then shot me one more stare that I took as intended to be a withering glance. Finally he said: ''Tell me, sir, have you ever heard of something called 'Nausea'?''

''The book by Sartre?''

''The rock group.''

''Well, ah . . . yes, Colonel, I suppose I have. These groups come and go so fast these days—''

The Colonel nodded, knowingly. ''First wave commie infiltrators.''

I coughed. ''Well, ah. . . . The aliens . . . told you this over the phone last night?''

''You bet your pink cheeks they did, sir. Every mother's son of them is an agent of the Kremlin.''

Myron tossed some butter into an iron skillet. There was a twinkle in his eye. ''It goes beyond just the one group, you were saying before, Colonel. . . . By the way, Mr. Woodside, did Oliver say if he'd be back for dinner?''

''I think he expects to be back around six-thirty.''

''Pity,'' Myron said. ''I believe I've got the physical chemistry of Sauce Béarnaise down from empirical art into a reproducible synthesis. Will you join us for dinner, Colonel? It'll be ready in about fifteen minutes.''

''*Listen!* It *does* go beyond this one group of degenerates. They've got their tendrils in the whole music industry. . . . By the way, no, Myron, I'll be grabbing

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some C rations back at my place, then I'll be working on my book. This has got to reach the public in a coherent form when the time is right."

"When will the time be right, then, Colonel?" A waft of tarragon reached me from the stove and I realized I was famished.

"Why, when the aliens make their move, of course—the fourth of July, 1993. They'll be positioning themselves for the takeover until then."

"Ah, would that be a takeover of our government, or theirs?"

"MCA and the musician's union."

"Oh."

"Of course, it's bigger than that. Some parts I'm sworn to reveal to no one until the right time. But I'll give you a hint. . . . Did you ever hear of Kansas Gold Bread?"

"Well, I've seen their commercials on the wide-screen," I said.

The Colonel stood up and slapped his thigh with his riding crop. "Don't eat any. Think about those initials." He saluted us both by touching the crop to his forehead. "I can't say any more. Good day, gentlemen." And he strode out of the room.

The cat gave an annoyed cry and curled up against my shoes as the door slammed.

"The Colonel believes in dramatic exits," Myron said, stirring something in a small pot. "I'll have this steak *au Poivre* and Belgian endive ready at the same time it appears . . . and I hope you like pumpkin soup."

I was lost in thought. "What? Oh, I'm sure . . . You know, Myron, something your brother said yesterday about Colonel Georgi just recurred to me."

"What's that?"

I shrugged. "Oh, just the suggestion that he may not be quite as balmy as he appears."

"He only moved to the neighborhood a few months ago," Myron said. "I never saw much of him until this goblin thing got him wound up. He sure *acts* like a looney tune—" A phone started ringing somewhere close at hand. "Would you get that, Mr. Woodside? I can't leave the sauce at this stage."

I looked about the clutter, trying to home in on the insistent ring.

"Third drawer over there, next to the sink," he explained and I immediately noted the black cord pinched into a cabinet drawer.

It was Marcia and she sounded the least bit disappointed that Baker wasn't present to take down her report directly. I was frankly at a loss to explain what the series of newspaper stories that she'd gleaned from the library files had to do with the present case. But I took down the information dutifully and even tried to appear cryptically interested, as if I were privy to some larger picture in which this report played a key part.

Marcia seemed convinced by my contrivance that her afternoon's work would lead us to an expeditious denouement of the case. She signed off with a cheerful note in her voice, suggesting that I bring "that nice Dr. Baker" home to dinner at the first opportunity.

By the time I'd read through my hastily scribbled transcription for the third time a delightful aroma was permeating Myron's kitchen. He was clearing rocks and laying down plates. "Does this whole business make any sense to you yet, Mr. Woodside?" he asked, wiping

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his hands on a towel tied to a drawer handle.

I tucked the notes into a shirt pocket and shrugged. "Somebody is trying to frighten Marvin Leffler into selling his farm. That much seems clear, anyway." I explained our experiences at Lititz Testing and the results of the analysis at Monash. "Your brother seems to feel that there are additional complications, but I confess—"

I was interrupted by an insistent knock at the kitchen door. Myron opened up and Marvin Leffler bustled nervously into the room carrying a tattered suitcase. "I had enough," Leffler said. "Can't stay in that place another night alone. Myron, you got to put me up until my nephew can pick me up tomorrow—"

"Now settle down. Of course you can stay. I'll put another plate on for dinner." Myron took his suitcase and ushered him into a chair.

"It's gettin' dark now," Leffler said. "I just got a feelin' that thing's gonna make a move on me tonight. I can't take no more of this—"

"Baker feels we're getting to the bottom of this thing," I said, trying to reassure him. "There's nothing supernatural involved. Someone's trying to frighten you, Mr. Leffler, that's all. We'll . . . ah, apprehend them very soon."

"Frighten me?" Leffler said, twitching nervously. "Well, they done a good job on it, I'll say that—"

Dinner was excellent and Myron and I ate with relish, though Leffler just pushed at his food. Myron was piling dishes in the sink when I heard Baker's Volkswagen screech to a halt outside. Several minutes passed and when Baker didn't come in I stepped to the door.

Baker was unloading a farraginous collection of junk from the trunk and back seat—hoses, jars of reagent chemicals, and cardboard boxes of various sizes, including one large one marked, "Berks Costumers."

I walked out and stared in amazement at the scattered miscellany that now surrounded the little car.

Baker looked up. "Let's get this inside quickly, Woodside."

I hesitated, trying to imagine just what all this could be intended for.

"Come, Woodside, come," Baker said, lifting several small boxes. "The game is afoot!"

"Really, Baker, is this entirely necessary?" I was staring at my reflected image in a full-length mirror in Myron's attic bedroom/observatory.

"I'm afraid so, old fellow," Baker said, adjusting one of the hose clamps on the battery-operated pump that was strapped under my right arm.

"I look like some sort of automaton with all these wires and tubing." And, indeed, I resembled a decorticated C3PO—with wires running across my chest, and plastic tubes running every which way, all connected to small reservoirs of reagents which were taped to both legs.

"Now if you'll step into the costume, I'll retrieve your helmet from the box—"

I sighed and reached for the white plastic coveralls that were designed to look like a NASA spacesuit. It was an extremely awkward feat with all the equipment Baker had attached to me; I spent a frustrating moment hopping

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around on one foot, working my leg into the opening of the costume.

"Drat!" I heard Baker say.

"What's the matter?" I sat down carefully in a chair to squirm the rest of the way into the coveralls.

"The costumer neglected to include your space helmet."

"Well," I said, suddenly feeling relieved, "that requires that we abort your plan for tonight."

Baker appeared lost in thought, then he smacked his palm. "By Godfrey, no it doesn't, Woodside! Stay right there —I'll be back in a moment!" And with that he dashed down the steps.

He returned several minutes later carrying one of Myron's prize pumpkins under his arm.

"Oh, no you don't, Baker!"

"It's just the thing, Woodside," Baker said, spreading newspapers on a small table and resting the big pumpkin on them. He produced a clasp knife from his trousers pocket and looked at the pumpkin thoughtfully. "Somehow, it seems rather appropriate, don't you think?" he said.

Baker had instructed Myron to walk by stealth and a circuitous route to Leffler's farmhouse and to turn on enough lights there to suggest occupancy. Baker and I would motor to an area of the woods accessible from the highway and only yards from the edge of Leffler's fields. Myron was to sneak out under cover of darkness and rendezvous with us there. After that the plan seemed a little vague. Presumably, my chemiluminescent costume would so bewilder the goblin or goblins that the brothers Baker could subdue them. The scheme appeared very questionable to me and Leffler agreed. "That ain't gonna scare nobody," he said, indicating my attire. "That there's a pumpkin, anybody can see that."

"With the pump in operation the simulation should be adequate," Baker told him.

We left Mr. Leffler watching *The Eddie Murphy Show* on an antiquated color portable in Myron's living room, after discouraging his offer to spend the time cleaning up the place.

"How is that . . . outfit to walk in, by the way?" Baker asked as we neared the parked Volkswagen.

"The walking isn't bad, but it smells terrible in here. And this thing is heavy . . ." My voice sounded strange, reverberating inside the hollowed-out pumpkin. And, needless to say, I felt absolutely ridiculous.

Baker was about to slip in behind the wheel, when he paused and drummed his fingers on the roof of the car. "Mm, it seems we have a small problem, Woodside. Your headgear appears to be too large for the vehicle. Perhaps, if you knelt on the seat and hung your head and shoulders over the backrest . . . I'd rather not have to redo all that sealing tape we wrapped around the base of the gourd—"

I managed to crawl into the car in the prescribed manner and found myself staring into the dark recess of the back seat through the perforated plastic visor that Baker had glued to the front of my "helmet." I felt a wet pumpkin seed dribble off my nose. Then I heard the car door slam and Baker started the engine.

I can't imagine what kind of aspect

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we represented on the rural roads of Lancaster, if any passing motorists chanced to catch a glimpse of us in their headlights. It was several minutes later that Baker stopped the car and I heard the rustle of plastic. "I'll just cover you with a few torn trash bags here, Woodside. We wouldn't want to arouse any curiosity—"

A few minutes more driving and again we stopped.

"Tree branches," I heard Baker say. "My refuse hauler refused to take them."

"Okay, Mac. That'll be a five dollar dumping fee. And you put that stuff where I tell you." There were some mumbled instructions and I felt the little car accelerate.

"Hang on, old fellow," Baker said. "The ground seems a bit soft here."

The car was lurching from side to side and I could feel our wheels alternately spin and catch. Finally, we stopped and Baker set the hand brake.

I struggled free of the draped trash bags and wriggled out of the car. Even through the wet pumpkin smell I could detect the reek of garbage. It was pitch dark outside the range of the little car's headlamps, but I could distinctly make out mountains of trash all around us.

"Welcome to the Gring's Mill Public Landfill, Woodside," Baker said, surveying the rippled mounds above us.

"Good heavens, Baker! What are we doing here? I thought we were supposed to meet Myron at the edge of Leffler's farm."

"Your wife's report confirmed my suspicions, Woodside. This area is the true focus of the case."

"But I don't see—"

"Perhaps, we should retest the apparatus now. Start your engine, would you, old fellow?" With that he reached into the open window of the Volkswagen and extinguished the headlights.

We were plunged into a complete dark that caught me by surprise. The moon, evidently, was obscured behind cloud cover. I groped for the door handle of the car to steady myself on the loosely packed soil.

"Any time, Woodside."

I was fumbling for the small switch attached to my waist. When I found it I was rewarded by the tickling vibration of the battery operated pump under my arm. There was a soft gurgle and hiss as the reagents emerged in a fountain spray from the nozzle that replaced the pumpkin stem at the top of the headgear.

And then quite suddenly everything lit up with brilliant blue light.

I was a human rainstorm of chemiluminescence, the glowing liquid coating the costume spacesuit with turquoise radiance.

Baker walked around the car and studied me from a few paces away. He looked for all the world like an artist critically examining one of his recent creations. "Convincingly phantasmal, I should think," he said, and I thought I noticed a wry smile on his face through the blue glow that was streaking down my faceplate.

"Now then, Woodside, I think it would be singularly efficacious if you would wander a ways on your own, while I follow at a discreet distance. When the principals of our search are discovered, I will move to your aid. That's the stuff, old fellow. Head on down to the far end of this ravine. Watch

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your footing. . . . And remember, I'll be near at hand."

I walked with my arms slightly extended to help maintain my balance in the powdery earth, which was crisscrossed by the treadmarks of heavy trucks. Mountain ranges of garbage loomed in all directions, lit from below by my own effulgent aura. I saw layered strata of plastic trash bags and bundled newspapers, rusted drums and automobile tires extending to the limits of vision. I began to feel like the glowing lure of an angler fish, trawling the depths of some abyssal trench for Baker's prey.

Several minutes had passed in this manner, accompanied by a sense of growing apprehension. I turned to look behind, but Baker was nowhere in sight. I noted that I'd been leaving a spoor of iridescent blue that diminished into the darkness.

The insistent vibration of the pump was producing an irrestible itch on my right side and I was cold and uncomfortable. I began to seriously question the results of my army alpha test. At the moment it seemed that any degree of involvement with Baker was tantamount to an admission of feeblemindedness. My present situation, then, amounted to incontrovertible proof that all four wheels were in the sand.

As if in confirmation, I began to lose my footing in the soft earth. I twisted in a kind of drunken *grand jeté* in a frantic attempt to regain my balance. The garbage mounds spun in the blue luminescence. When I caught myself and felt my costume boots dig into the loose soil, I found myself facing one of the white-hooded goblins. The figure must have just emerged from behind one of the mounds and it stood now, not ten meters away, its cyclopian spotlight glaring into my eyes. In its gloved hand it held something that looked like a large-barreled plastic raygun.

I swallowed my heart several times as it regarded me, cocking its visored hood like a parrot studying a suspect cracker.

In the next instant a second white goblin appeared, scrambling down one of the nearby mounds of garbage amid a trickle of tin cans and fluttering papers. This one began making some motioning signs. Though it seemed improbable, the odd arm motions seemed directed at me rather than toward its companion.

I snuck a quick glance backward, but there was still no sign of Baker. So, for want of a better plan, I crudely mimicked the strange waving motions of the second figure. They both watched my attempts with what I took to be patient interest.

The glare from the two searchlamps was making me squint, so I shielded my glowing faceplate with a cupped hand.

They both seemed to take this as some addendum to the message and in unison they pointed back toward the wall of trees that edged the dump.

I began to feel like an anthropologist field worker. I reproduced the pointing gesture with a phosphorescent arm and ventured a couple of steps closer to them.

And then I saw something move in the distance. Among the dark woods at the back of the landfill, a blur of blue haze was drifting between the trunks.

Neither of my new-found friends ap-

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peared to notice, but it rapidly became apparent to me that we were about to be joined by the blue goblin. And, indeed, a moment later a glowing blue humanoid with a bulbous head emerged from the forest and began trotting toward us.

My mirror-image was almost upon us before the gesticulating hooded figures saw him. One of them gave a high-pitched cry and the other turned its head back and forth between us in disbelief. Then they both began jabbering in the same strange tongue I had heard them use in the woods last night.

My own reaction went through several distinct phases, none of them particularly pleasant, but it plateaued out at blind terror when I realized the blue goblin was holding a .57 magnum handgun. That was a weapon of more immediate concern to me than the plastic thing the white figure was holding, particularly since it was pointed dead-center at the pumpkin I was wearing.

As the blue goblin moved nearer, our combined luminescence produced a kind of ersatz daylight in that canyon of the Gring's Mill dump. If I had been capable of thought at that moment I might have imagined how we might have appeared to the pilot and passengers of the commuter plane that passed directly overhead just then, its winglights blinking sedately.

But the muzzle of that gun commanded my complete attention. I was seized up like a rusted engine, wanting to flee, but too frightened to move.

The three figures closed around me now, the two white goblins flanking the luminous blue with its enormous gun. Three pairs of sinister-looking eyes peered at me from behind three rectangular panels.

"Trick or treat?" I gasped.

At that moment there was a rumble from overhead and, as the four of us looked up, an avalanche of trash bags and bounding rubber tires was descending from the top of the nearest mound. The tumultuous subsidence and its ensuing effect transpired in my fear-muddled perception like one of those slow motion scenes of violence that Hollywood movie makers have always been so fond of. A treadless Michelin whitewall caught the blue goblin's raised gun-hand and the formidable weapon discharged with a deafening roar. What appeared to be the wringer of a washing machine caromed off its glowing helmet and the spheroid rent like an eggshell. As the goblin fell, a geyser of luminescent blue shot up from its suit. In the meantime, the white-hooded figures were awash in a tidal wave of plastic trashbags, which had bowled them over instantly, and now threatened to submerge them from sight.

Somehow, to this point I had managed to keep my footing, though pelted by a torrent of tin cans, fish heads, and miscellaneous debris. I danced backwards, out of harm's way, as it were, and felt suddenly chipper as I noticed Baker's head poking out over the top of the mound from which this landslide had been engineered. His brother, Myron, looking rather sweaty from exertion, appeared next to him.

"Good Lord, Woodside, your head!" Baker shouted. "Are you quite all right, old fellow?"

"Why certainly," I answered, waving to him. Then my hand brushed the

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top of the pumpkin. My finger probing the golf ball-sized hole was the last thing I remembered.

I awoke with a start to the smell of ammonia. Baker was holding a vial of smelling salts under my nose. My pumpkin had obviously been removed and someone had tucked a trash bag under my head as a pillow.

I sat up and blinked into the camping lantern Myron was holding. Our three goblins were lined up with their headgear removed as well. Each was securely handcuffed and fettered with leg irons. I squinted toward the police squad car where they stood, bathed in its flashing red light.

"How are you feeling, Woodside?" Baker asked. "You appear to be uninjured."

"Oh, I'm fine, Baker. I just—" I caught a glimpse of one of the goblins' faces as he turned in profile. "Leffler!" I said in amazement. He heard his name and scowled over at me before disappearing into the back seat of the patrol car. He was followed by the two others—dark-complexioned men I didn't recognize.

I stood up in the damp costume, its luminscence now faded and already starting to yellow from the reagents that had been fountained over its waterproofed fabric. "I was convinced that Colonel Georgi was our blue goblin," I said.

Baker nodded toward the police car. "Several things led me to suspect Leffler from the start. First there was the obvious fact that no one had ever been present when he claimed to have observed the blue goblin. And then there was the matter ot those unusual footprints Myron discovered. While the household was sleeping yesterday morning, I took it upon myself to investigate Leffler's attic, where I discovered a suit of medieval armor. The foot coverings closely match the impressions that Myron made. Moreover, a close examination revealed traces of topsoil in the interstices of the metal.

Myron rubbed at his beard, still perspiring. "Even now I can't understand his motivation in all this. And just what were those two Iraqi fellows after?"

"Iraqi?"

"No doubt you are not conversant with modern Persian, Woodside. Last night in the woods their excited exchange revealed their origins. The nickel-titanium object, then, was the key to the case, as confirmed by your wife's library search."

"I'm afraid I still don't understand." I admitted. "And what about the rock sample? I thought we decided that someone was trying to scare off the local farmers for the lithium ore deposit?"

Baker shook his head. "A fabrication contrived by Leffler."

"But what about that Mason James fellow and his phony analysis?" I asked.

"Leffler, I believe, will turn out to be some sort of sleeper agent for the Kremlin." My brows went up at this. "—While Mr. James's part in this is somewhat more benign. I believe he merely accepted a bribe to use his little magnet trick on anyone who should happen by with one of those unusual-looking rocks."

"Your wife's researches confirmed that Jodrell Bank lost tracking on a satellite which the Soviets launched for the Iraqi government. I believe it was used as an imaging probe to provide the pro-Soviet parts of the Arab world with tactical information. Contact with the sat-

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ellite was lost on September 14 at 11:54 P.M. Eastern Daylight Time. At 2:27 A.M. observers reported a fireball splash into the Great Slave Lake near the city of Yellow Knife in the Northwestern Territories of Canada. Dredging operations by the Canadian government and a team from the US Defense Department have recovered enough remains of the satellite to suggest it represents a radical new Soviet design based on organic superconductor technology—''

''That was in the notes I gave you from Marcia?''

''Reading between the lines, Woodside. For one thing, Dr. Marsden of MIT was mentioned as having been brought in to study the components. These new devices are his specialty. At any rate, if true, the Soviets may have made a quantum leap in an area of technology where they have been considerably behind the United States in the past.''

Baker paused for a breath and I noted that his audience now included one of the police officers. ''Colonel Georgi reported seeing his alien ship land near here like a green-glowing meteor on September 15 at 4:17 A.M. If the Iraqi satellite broke apart during reentry lighter weight pieces would, of course, be slowed proportionately more by atmospheric resistance. The piece that fell here was a subsystem that included a thermoelectric power source heated by a radioactive isotope and a self-erecting antenna.''

''How do you know that, Baker? Did you find it?'' The policeman seemed to be as interested in Baker's story as Myron and I, I noticed.

''As a matter of fact no, Woodside. There hasn't been time and the Federal authorities are, after all, better equipped for these kinds of things. The facts are quite evident, though. The Iraqi agents were wearing their strange suits and hoods as radiation protection in the event that the subsystem's integrity had been rent during reentry or upon impact—a not unlikely possibility. You may have noticed that one of them was carrying a radiation detector.''

I nodded. ''The ray gun.''

''The nickel-titanium object that they dropped in the woods was, in fact, part of the subsystem's antenna, which must have been broken off and hurled clear when the object impacted somewhere in the Gring's Mill dump. These shape-memory alloys can be fabricated into elaborate structures and then folded compactly for launch. Once in space, a small heater warms them to their phase transition and they return to their original shape, like a parasol opening.''

''All right then,'' I said, ''but I still don't understand about Leffler and the lithium rocks.''

Baker rubbed his long cheek. ''Leffler's sympathies are with the Soviets, whether by virtue of misguided ideology or through the promise of monetary gain. He, like Colonel Georgi, saw the meteor land at Gring's Mill. But in his case the true implication became apparent to him. His espionage contacts must have confirmed that both Russia and Iraq were anxious that their new superconducting satellite design not fall into American hands. The Iraqi recovery team was dispatched to Gring's Mill, while Leffler was assigned the task of allaying any suspicions that their activity might provoke. His plan was bold and effective. First, he created the blue goblin costume for himself—a design, I noted here tonight, that was similar in most respects to my own. Then he ap-

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peared in this chimeral aspect on random nights at various places among the neighboring farms. Often enough to get the local farmers agitated and talking. The police, of course, found no evidence of his appearances, so they were unlikely to respond to further calls, if someone were to see the Iraqi agents in their protective trappings." The policeman who was taking all this in coughed, but remained silent.

"Leffler knew that the satellite recovery operation might require weeks in the morass of the Gring's Mill Landfill, and that, despite his early efforts, the possibility of their activities being discovered were perilously high. At this point he launched the second phase of his plan, and it seems to me that it was really quite brilliant. He obtained samples of lithium concentrate clinker —probably from the mineral processing plant at Mount Carmel, just over the Maryland border, south of here. He scattered this ersatz high-grade ore over his own farm and a few others in the neighborhood and then began broadcasting a story that he was being made the principal object of the goblin's hauntings. The footprints in the flowerbed and his declared intention to vacate his farm convinced Myron to call us into the game. In this Myron was playing right into his hands, for Leffler's sole intention was to direct an investigation toward his farm and away from the dump. Leffler was further aided by word from Myron about the approximate time we were expected to arrive in Lancaster." I watched Myron nod in agreement at this as he scratched the bush under his chin.

"A small bribe at Lititz Testing and a fresh but directionless trail of luminol across his property and he was ready for us. Like a well-crafted novel that can be read at two levels, the second layer was in place: investigators are called in and uncover a plot to frighten a local farmer off of his valuable land. In the meantime, the activity at the landfill goes unnoticed. This evening we left him at Myron's house with our declared intention of trapping the goblin on his farm. He must have donned his attire in some secreted place in the woods with anticipations of leading us a merry chase over his fields. But when he arrived as the goblin and found no trace of us and then discovered that Myron was not at his farmhouse, he began to realize that the game was up. He proceeded here to the dump after acquiring that weapon from his house—a possibility I regret not having anticipated."

Baker shrugged his lean shoulders. "No one was hurt, that's the important matter. Our landslide worked with precision and all the principals in this affair are in custody, though it will be a matter for the FBI and the Justice Department to decide just what charges will be leveled."

I was cold and wet and already seemed to feel the beginnings of a head cold. I wanted to take a hot shower and, perhaps, a snifter of brandy and forget all about this business, but one more point just couldn't wait. "And what about Colonel Georgi, then, Baker?" I asked.

Baker smiled and reached into his coat pocket. "Leffler made good use of him as a means of broadcasting gossip and stories about the goblin around the neighborhood, but his part in all this is quite innocent." Baker stuck a licorice pipe between his teeth and puffed on it absently. "Just a harmless crank, Woodside," he said. ■

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on gaming

Dana Lombardy

The Argos Expedition by CBS Software is a computer learning game for the Commodore 64 that combines light text and arcade action in a space exploration adventure. *Argos* is designed for younger gamers, and is packaged in a book-style plastic box with a Mission Disk, an Artifact Disk, a deck of Secret Goal cards, and a 36-page instruction booklet.

The front of the package says, "Work Together to Conquer the Final Frontier." The emphasis here is on "Work Together." Two to four can play, using joysticks and paddles to cooperatively maneuver the spaceship, destroy meteors that threaten to hit the vessel, and gather artifacts. Within this cooperative effort, however, each crew member may have individual, secret missions.

Since the nature of an Artifact is unknown when it's brought aboard, crew members must take it to one of ten exploration chambers where they can attempt probes to determine its original purpose. Certain information is straightforward, but most must be deduced from clues. A picture of the Artifact appears on the right side of the screen and the object may move or emit a sound; the Artifact's name, such as "Place Cube; 'Home Sweet Home,' " will also appear. If crew members can't deduce the nature of the Artifact from these clues, they may perform tests to probe for its Materials, Input/Output, Culture, Connections, and Use.

Artifacts that are returned to Mission Control earn bonus credits for crew members. Unfortunately, traveling about the solar system requires fuel. As energy reserves run low, the crew may have to burn Artifacts to keep the ship going.

Running out of fuel isn't the only hazard in space travel. Meteors can damage the ship unless they are destroyed before they impact. Ship defense is a cooperative effort with some crew members firing red lasers and others firing blue lasers. The colors determine which lasers to use against different types of meteors.

Other dangers include the Gravity Warp, which requires all crew members working together to steer the ship out of the Warp safely. The spiral Wormhole tries to draw the ship to destruction in its center by using a melody like the mythological Sirens. Crew members must match the melody note for note to escape the Wormhole.

The Argos Expedition, part of the CBS Children's Television Software line, is not intended as a serious simulation of space flight. It's reviewed here to bring it to the attention of anyone looking for a game that can serve to introduce young computer users to games requiring logic skills. Its similarity to popular arcade action games makes *Argos* a good choice for keeping these gamers' attention while requiring them to deduce information from clues given.

(continued on page 107)

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Sometimes the line between "improvising with available resources" and "asking for help" isn't as clear-cut as you might think!

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HATCHING SEASON

Harry Turtledove
(formerly "Eric G. Iverson")

The Montana Rockies reared against the western horizon, a purple-black jumble of stone. The breeze came from the east. It carried a spicy, resinous conifer tang and, more faintly, the smell of the sea.

From her blind in the center of a clump of cycads, Paula Shaffer watched the hadrosaurs foraging by the river. Not many people, she thought with a touch of pique, remembered the big, ungainly duckbills when they heard the word "dinosaur." The bizarrely horned ceratopsians and savage tyrannosaurs were the ones that sprang to mind, just as

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"mammal" was more likely to call up the image of a tiger or a giraffe than that of a cow.

Yet there are a lot more cows than tigers or giraffes, and the hadrosaurs were among the most successful dinosaurs of the Cretaceous. And so they would remain for another ten million years, until the asteroid strike that would turn the world's climate upside down and bring all the dinosaurs to an end.

Besides which, Paula's dissertation was on hadrosaur behavior. The beasts were not dramatic, but she found them fascinating. A good thing, too; her grant only gave her two weeks of fieldwork. She was just thankful she had arrived in the middle of hatching season. That was pure luck. The time probe couldn't pick out a specific season, or a specific year either.

Something bit her on the ankle: a dinosaur tick. She exclaimed in disgust and popped the tick into an ampule of formaldehyde so she could take it uptime with her. It had already begun letting go when she grabbed it. The warm blood she shared with its usual hosts had drawn it, but she did not taste right. An eon of evolution saw to that.

"And I'm not one damn bit sorry, either," Paula muttered, slapping a Band-aid on the oozing puncture.

While she was taking care of herself, a hadrosaur ambled over to browse on the palmlike leaves of one of the cycads around her. Even though it walked —waddled, really—with a pronounced forward stoop, it still stood a meter and a half taller than she did; it was about seven meters long. If it decided to go through the stand of cycads instead of around, all she could do was dodge.

It showed no intention of that, though, as it happily munched away. The small, flat teeth inside the duckbill made a grinding noise rather like that of an enormous peppermill. Paula giggled. " 'Its rumblings abdominal are simply phenomenal,' " she said into the recorder, quoting the only limerick both funny and clean ever written.

The hadrosaur had a cool, almost pleasant odor, not quite like any she knew in her own time—strange plants in the diet and strange pheromones, she thought. The beast did a good job of denuding the cycads before it moved on to look for more food. Like an elephant, it spent a lot of time eating.

It paused, grunted, and lifted its tail, leaving a large dropping behind as it waddled on. Only a specialist could have told the flies buzzing around the turd from their modern equivalents. Along with roaches, they had found their niche early and prospered in it.

That was depressing to dwell on. Only time-travelers, Paula thought, really realized what a mayfly man was on the face of the Earth . . . and no one came back from the Cretaceous without a new perspective on the permanence of his works.

With an effort of will, she put aside her gloom. Before she started this fieldwork, her chairman had warned her she would be her own worst enemy here. "It always happens that way," he said. "You'll be the only thinking being on the planet. Sometimes I think that's too large a burden to put on anyone."

"Yes, Professor Musson," she had said dutifully, wishing he wouldn't turn mystical like that. Now she saw he had

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been speaking from experience.

The hadrosaur grunted again, a welcome distraction. It bent to uproot a large fern, and then another close by. Instead of eating them, though, it left them in its mouth as it walked purposefully downstream.

Excitement ran through Paula. She rolled up the green nylon mesh under which she had hidden, stuffed it into her backpack. Then she emerged from the cycads to follow the dinosaur.

It looked back at her suspiciously. It had no innate fear of man, of course, but many small, carnivorous dinosaurs were bipeds; it might have perceived her as one of those. She ducked behind the trunk of a cypress. Being without any memory to speak of, the hadrosaur forgot her as soon as she was no longer visible.

She trotted after it; even the waddle of a seven-meter beast is a long way from slow. From time to time her hadrosaur exchanged moans and hoots with others of the herd it was passing. She recognized the calls as mere acknowledgment signals, but kept her recorder going nonetheless. Someone had recently done work on hadrosaur calls in New Mexico; it might be worthwhile finding out if the "dialects" differed from North to South.

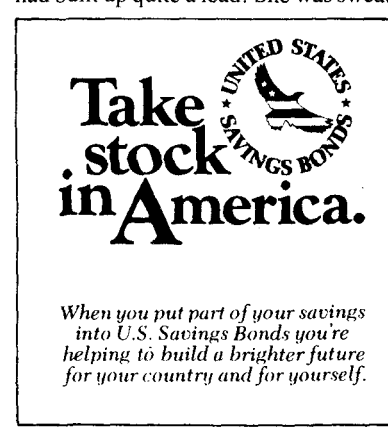
A hypsilophodont flashed by her, squeaking in terror. The little dinosaur ran on its hind legs, but it was a vegetarian; speed was its only defense. It was going flat out, its long tail stiff behind it to serve as a counterpoise to the weight of its trunk.

It needed all the speed it could muster, too, for on its heels was one of the horrors that made even the bulky hadrosaurs nervous: a *Deinonychus*. The predator was about two and a half meters long, and built along the same general lines as the beast it was pursuing. But its long forearms ended in clawed, grasping hands, and the third toe of each foot in a vicious twelve-centimeter talon made for slashing.

The *Deinonychus* ran the hypsilophodont down about a hundred meters from Paula. It seized its thrashing victim with those clutching forefeet, held it away from its own body so it could bring a hind foot into play for a disemboweling stroke. Its tail balanced it and kept it upright while it stood on one leg for the kill. When the hypsilophodont was dead, its slayer stooped over the carcass and greedily began to feed.

Shuddering, Paula slapped the .45 on her hip. The *Deinonychus* could as easily have chosen her to attack, but a slug or two would have gone a long way toward changing its mind. She wished for a grenade-launcher, in case one of the bigger carnivores deigned to notice her. She was glad they were uncommon.

She hurried after the hadrosaur, which had built up quite a lead. She was sweat-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ing hard by the time it reached the nesting ground, both from the exercise and from the muggy subtropical climate.

The nesting ground reminded her of nothing so much as a sea-bird colony at breeding time. That was fitting enough, she thought, for what were birds but the feathered survivors of the dinosaur clan?

Here, though, the scale was vastly larger. Each bowl-shaped mud nest was a good two meters across and more than a meter high. The musty odor of rotting vegetation overpowered the dinosaur smell in the area. The hadrosaurs did not sit on their clutches of eggs, but, like crocodiles, used the heat generated by the decaying plants they put in their nests to help hatch them.

Not all the clutches had hatched yet; some still had parent dinosaurs hanging about to protect them from predators, as penguins guard their eggs against skuas. Paula saw one hadrosaur grunt threateningly and lower its head as if to charge at a *Troodon*, a small flesh-eating dinosaur of a type that often raided unguarded nests. The *Troodon* hissed but drew back.

The hadrosaurs were not perfect guardians. A lizard scrambled off the side of a nest and scurried away, still licking yoke from its jaws with methodical flicks of its black, forked tongue. The parent dinosaur was only a couple of meters away, but made no response. To an adult hadrosaur, a lizard was so small as not to exist.

Paula's hadrosaur pressed through the crowd of its fellows; she followed more circumspectly. Fragments of old eggshell crunched under her boots. The hadrosaurs of this herd had been returning to their breeding site for uncounted generations. Again she was reminded of sea-birds.

And so, despite its minuscule brain, her beast knew where it was going. As it approached the nest it had built, she shifted her video camera to telephoto. If she tried to get closer herself, the hadrosaur would drive her off as the other had the *Troodon*.

Her hadrosaur leaned into its nest, dropped the load of ferns it had been carrying for so long. Instantly a couple of dozen hatchlings swarmed onto the food, eating as if there were no tomorrow. Their squeals of excitement were a soprano mimicry of their elders' deep-toned calls.

Watching the babies, Paula could not help smiling. A seven-meter hadrosaur was a staid, serious beast, foraging with single-minded intensity. A thirty-centimeter, newly hatched hadrosaur was something else again. The hatchlings hopped about, falling over one another and leaping back in alarm from imaginary dangers. They squabbled over leaves and branches and bit each other's feet and tails.

When one of the hatchlings tried to scramble out of the nest, the adult hadrosaur used its duckbill to bunt the little beast back. Another baby did succeed in getting out, and started to wander away. The full-grown animal gave a snorting call. The youngster obediently turned around and climbed back into the nest.

Paula wished she knew whether the adult was male or female; the sexes had no obvious differences. One school held that both parents cared for the young, the other that only the mother did. One day a team would stay in the Cretaceous

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for a whole year, and find out the truth. When the funding for that kind of project would come through, though, was anyone's guess. No time soon, Paula thought sadly.

Another fully grown hadrosaur was leading an older brood, just out of the nest, on a foraging expedition. The juveniles were almost as long as Paula was tall, and were beginning to lose their immature blotching for the solid green-brown of the adults' hides.

When her hadrosaur left to gather more food for its young, Paula cautiously approached the nest to learn exactly what plants it fed them. The hatchlings scrambled back in fear as she pawed through the remains of their feast.

She was surprised to see one egg still standing upright, unhatched. A bit more than half of its twenty-centimeter length was visible above the rotting vegetation in which it had been laid. The gray-green shell was ridged, to give it more surface area to release the carbon dioxide the developing embryo produced.

She thought for a moment that this egg was infertile, but then she noticed the crack running along one of the vertical striations. The baby hadrosaur was about to hatch; perhaps it had been delayed because its egg was not as well covered as the rest of the clutch and therefore incubated more slowly.

She focused the video camera on the egg; as far as she could remember, no one had ever recorded a hadrosaur hatching. It was a shame the parent was not around, she thought, so she could see how it reacted to the new arrival.

The emergence was a struggle —dinosaur eggshells were a couple of millimeters thick. At last the baby hadrosaur lay gasping in the nest, still wet with fluid from the inside of the egg. One of its brothers or sisters, utterly indifferent, walked on its head.

It paid the sibling no more attention than it had been given. Paula, however, was big enough to notice. The baby hadrosaur opened its mouth and waited expectantly.

Paula burst out laughing. She could not help it: the little animal looked just like one of the stuffed toys the university bookstore sold. "All right, pal, you've earned it," she said. She found some tender fern leaves the other hatchlings had missed, fed them to the youngest one. It chewed rapturously.

A grunt from one of the adult hadrosaurs nearby made Paula jump away from the nest in a hurry. She did not want the beast mistaking her for a predator. It was too stupid to listen to explanations, and too big to argue with.

Another grunt came from behind her, this one treble rather than bass. The newest hatchling had struggled up to the rim of the nest and was peering about. When it saw Paula, it leaped down, landing in a heap at the base of the nest. It staggered to its feet and came after her.

"Oh, for heaven's sake," she said in exasperation. She picked up the little hadrosaur. It wriggled and batted her wrist with its tail. As gently as she could, she set it back in the nest.

She drew away before she upset any of the adults again. That same high-pitched grunt came from behind her. She turned and saw the hatchling land even more clumsily than it had before.

"Stay where you are, would you

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please?" she told it. "I'm not your mama. . . . Or am I?" she added as it got to its hind legs and walked toward her.

Her eyes went wide. "You little son of a lizard, I think I've imprinted you!" Birds worked that way, she knew: they accepted the first thing they saw after hatching as their mother, which sometimes gave rise to such ludicrous spectacles as a long line of ducklings happily following a chicken.

The scientific community had realized since the late twentieth century that birds were a modern offshoot of dinosaurs. Paula did not think anyone, though, had recorded an instant of imprinting among dinosaurs—or looked for one, for that matter. "Sometimes you'd rather be lucky than good," she breathed, and started talking into her recorder.

She replaced the baby hadrosaur in its nest once more. "Third time's the charm," she muttered. She felt like shouting when the small beast again clambered to the top of the nest and looked about for her. To celebrate, she pulled up a newly sprouted fern too tiny for an adult hadrosaur to notice and gave it to the infant.

If anything, the second feeding strengthened the bond the little dinosaur had formed with her. "You think I'm the horn of plenty, don't you?" she said. As often as she returned it to the nest, it scrambled out again.

She was surprised how low the sun had sunk in the west. Soon it would fall behind the Rockies, peaks taller and more jagged than they would be eighty million years from now. She grimaced. The baby hadrosaur, now coming up to her for the umpteenth time, had eaten up a big chunk of one of her precious days in the Cretaceous. No, that wasn't fair, she decided—what she was learning from it was worth the time.

She picked up the hatchling and was about to replace it yet again when she heard the distress cries from the east. The adult hadrosaurs heard them too. Heads went up; eyes widened. Though they had seen nothing dangerous themselves, the adults echoed the distress call, alerting the whole herd for flight.

A hadrosaur burst from among the shrubs and tall ferns at the eastern edge of the nesting ground. Its waddling trot was desperately urgent. Alarm shot through Paula. Not many beasts were big enough to panic a dinosaur that weighed as much as a small elephant.

Paula shifted the hatchling to her left hand and drew her pistol, wishing again for something with more punch. Sure, big carnivores were rare, but she should have realized that a concentration of large herbivores like a nesting ground would draw them if anything would. Even the grenade-launcher she had thought about before might not stop a tyrannosaur.

The undergrowth shook again as the flesh-eater on the trail of the hadrosaur came crashing through. Paula's mouth went dry. It was not a tyrannosaur, but it was the next worst thing: the *Gorgosaurus* was nine meters long, three meters high, and armed with an enormous mouthful of ten-centimeter teeth. Paula wondered insanely whether a zebra cared if it was eaten by a lion or a leopard.

No such abstractions burdened the hadrosaurs in the nesting ground. They fled the moment they set eyes on the

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gorgosaur, and woe betide the nests or hatchlings that got in their way. Paula ran with them, praying she would not stumble. None of her training had dealt with being part of a dinosaur stampede. The only thing she was sure of was that going with the tide was smarter than trying to stem it. She had always thought King Canute was a damned fool.

The roar of the gorgosaur sounded like a steam engine with horrible indigestion. Paula could hear that the beast was gaining on the herd; she did not dare look back to see how quickly. Her breath sobbed in her lungs, but she kept running. In her undergrad days she had run a pretty fair 3,000 meters until the pressure of study made her quit the track team. Now she wished she had been a marathoner.

Something bucked against her left wrist. She realized she was still holding the baby hadrosaur. It squirmed and writhed, trying to get away. She hung onto it. It was not interfering with her running, and if she let go it would be crushed in an instant.

A whistling hiss came from behind her and to her right, signaling the arrival of another gorgosaur. That wasn't fair, she thought—the big carnivores were solitary killers. They did not hunt in packs, as *Deinonychus* and other small meat-eaters often did. The furious bellow of the first gorgosaur declared how little it welcomed its fellow.

Paula heard a shriek that reminded her of the scream of a wounded horse: one of the monsters had killed. Then the steam whistles started again, at double the volume, as the other gorgosaur disputed ownership of the corpse.

As the two great carnivores quarreled with each other, Paula drew in a shuddering gasp of relief. It was over now; the rest of the herd was safe. Soon the hadrosaurs would stop, and she could get out from among them.

Only they did not stop. Once begun, a stampede gains a momentum of its own, one with nothing to do with what had touched it off. Swaying with exhaustion, Paula loped a couple of paces to the side and rear of a fat hadrosaur with a limp. There was nothing else she could do, except give up and get trampled. The couple of times she tried drifting across the current toward the edge of the herd, she was almost run down. The same thing happened when she slowed. Gritting her teeth, she ran on.

Then the hadrosaurs were in among the trees and ferns south of the nesting ground. Up ahead, the leaders of the herd swerved this way and that, sometimes on account of the terrain, sometimes for no reason at all. In the forest half-light, Paula soon had no idea in which direction she was going.

She spotted a tree—a magnolia, of all things—that looked sturdy enough to hide behind while the herd streamed past. But as she swerved to make for it, one of the hadrosaurs caught her, quite by accident, with the very tip of its tail. She smashed against the trunk of the magnolia and remembered nothing more.

It was dark when she returned to her senses. She groaned as she sat up. Pain thudded behind her eyes with every heartbeat, held her ribs in a vise, dwelt like fire in her right wrist. She cautiously took a deep breath. The ache in

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her chest did not get worse. No broken ribs, anyway, she thought.

That wrist was something else. She could feel bone grate when she moved. As carefully as she could, she eased off her backpack. She fumbled in it left-handed for her flashlight.

Something by her left knee twisted in surprise as the light went on. "Are you still here?" she said, turning the beam away from the baby hadrosaur. After a moment's reflection, she decided the little beast had nowhere else to go. Away from its nest, what else could it do but stay by the one being that represented safety to it? There were dangers in the Mesozoic night: not only small marauding mammals, but also —and more to be feared—nocturnal cousins of *Deinonychus* that hunted the mammals and anything else they could find.

Such musing was only a small concern as Paula dug through the pack for a vial of pain pills. She dry-swallowed one and then, a few seconds later, another one. While she was waiting for them to kick in, she pulled out a bandage-roll and found a couple of sticks to use in a splint.

Her hurts began to recede. She undid the wrist strap that held her compass and the homer for the time probe. "Oh, Jesus Christ," she said. The drug made her sound detached and conversational, but she could feel the scream behind her words. Both devices were smashed to worthless junk.

She sat perfectly still, trying to will them back to life. When that did not work, she nodded bitterly, as if the failure were a petition a dean had rejected. She fought down panic. "First things first," she said, and went to work splinting her wrist.

Even as she tightened the bandage, though, her mind kept yammering at her. If she was not at the time probe when it left the Cretaceous, she was stuck here-and-now for as long as she lived, which wouldn't be long. They had drilled that into her during her training. The releases she had had to sign would have made a small book by themselves.

Perhaps it was the fear of being stranded, perhaps the blow to the head she had taken, but she made a bad mistake. Instead of waiting until morning and backtracking along the trail the hadrosaur stampede had left, she decided she had to know *at once* where she was and in which direction she should go. She got to her feet to look for a clearing so she could see the stars.

The baby hadrosaur trustingly scuttled along behind her, as it might have after a real parent on the way to a patch of berry bushes. After a while, she stopped and picked it up. "We've come this far; we may as well stick together," she told it, as if it understood.

The forest canopy kept all but the occasional star from peeping through. Paula kept walking—there had to be an open patch somewhere. Her flashlight beam drew insects, just as it would have in her own time. She drenched herself with repellant. Cretaceous biting bugs had mouthparts like drillpresses. They had to, to penetrate dinosaur hide.

Two or three times, she saw pairs of eyes reflecting her light in yellow or red. As long as the eyes were close to the ground and close together, she did not let them worry her.

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"At last!" she exclaimed some weary time later. A forest giant had toppled, and in its fall taken several smaller trees with it. Ferns and weeds were already filling the gap, but as yet the new growth was no higher than Paula's knees.

She went into the middle of the clearing and turned off her flashlight to let her eyes adjust to the dark. She was no great shakes at astronomy, but she was confident she knew enough of the major constellations to figure out which way was which.

Or so she thought, but when she looked up to the heavens, none of the patterns she saw meant anything to her. A red star stood almost directly overhead; it was bright as Venus. Several others here and there were nearly its match. The cluster close to horizon put the Pleiades to shame.

"Shit," she said as the realization washed over her. To her, the stars were the stars, and pretty much unchanging. Over eighty million years, though, that wasn't so; the Earth was almost halfway round the galaxy from where it would be. They had talked about this in training, but she had only listened with half an ear: what they were saying hadn't seemed useful, not when she had simpler, more accurate ways of finding direction. Now she didn't.

That old saw about moss growing on the north side of trees did not mean anything here, either. In this climate, moss grew everywhere.

About then, she figured out what she should have done. If she could retrace her path to the clearing . . . her laugh held desperation. She had got so turned around looking at the stars that she wasn't even sure from which direction she had entered.

"Stupid, Paula, stupid," she said. Before, being stupid had meant getting marked down in a seminar or having to do an experiment over. Now it was liable to kill her.

She was grateful for the pain pills. They took the edge off her fear, left her able to think straight, if slowly. When the sun rose, she would be able to tell directions from the shadows it cast, well enough to go roughly north. That would get her to the river, and give her an even-money chance of heading back toward familiar territory.

"Unless you have a better idea?" she asked the baby hadrosaur. If it did, it wasn't letting on.

Until morning, she decided, the best thing to do was rest. She intended to be as clearheaded as she could when day came. "No more screwups," she said firmly, getting out her bedroll. She set the hatchling down beside it. "If you want to go, go. Otherwise, I'll see you in the morning."

She thought she would be too keyed-up to sleep, but the next thing she knew, the sun was blasting full in her face. "East," she said: progress. She looked around for the baby hadrosaur. It was right where she'd left it, still sleeping, with its tail curled over its eyes.

"Wish I could do that," she said, and this time her chuckle was only one of honest amusement. The foolish little creature was good for her morale, and she needed all the help she could get. She picked up the hatchling—it let out a hiss at being disturbed, but quickly calmed—and started off.

Knowing which way she should go

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did not make the trip easy. Paula squelched into marches (and discovered the hard way that there were leeches in the Cretaceous), scrambled around tangles of undergrowth too thick to walk through. A couple of times the leaves overhead hid the sun altogether and kept her from gauging shadows. Once she emerged to discover she was going east instead of north. Shaking her head, she turned left.

Her cheer when she saw the river frightened the baby hadrosaur, which curled its tail round her wrist, painfully tight. She felt like one of Xenophon's men spying the Black Sea.

She cautiously approached the water and drank, always keeping one eye—and part of the other—peeled for trouble. Crocodiles and worse things infested Cretaceous rivers.

She peered upstream and down. As she had feared, the two directions looked equally unfamiliar. She set the baby hadrosaur down, fed it a leaf. "You don't know which way to go either, do you?" she said accusingly.

She stopped and gave it another look, a good long one. "Or do you?" The hadrosaurs of the herd always came back to the same nesting ground to breed. Were they biologically programmed to do so, as salmon always returned to the same stream or birds to the same island?

Nobody knew. Even after years of time travel, there was so much nobody knew about dinosaurs. If Paula had some reason to think the hatchling could find its way home, she would feel vastly better about picking a direction. As things stood, choosing which way to go was like playing Russian roulette with half the chambers loaded.

Her mouth tightened. Maybe she could find out. She set the baby hadrosaur down. It didn't go anywhere at all. It stood there looking at her. "I wish you didn't think I was your mama," she told it.

She picked it up again while she thought. After a while, she got out several feet of light cord and tied a cord of harness around the hatchling's forelimbs and back. She tied the other end of the cord to a stout chunk of wood that she anchored firmly in the ground.

Then she went back into the forest, making sure she stayed downwind so the hadrosaur could neither see nor smell her. The tape she was looking for was labeled *Nesting Ground—1*. She put on her headphones and skipped through the tape until she found the section she needed.

She played the snorting call at top volume. The baby hadrosaur's head came up. It started confidently upstream—toward its nest, she hoped, for that was what the call meant. The harness brought the hatchling up short. It did not understand about ropes, and kept marching in place at the end of its tether.

When Paula showed herself again, the hadrosaur turned toward her. She picked it up, still in its harness, and carried it and the anchoring chunk of wood a couple of hundred meters upstream. She put it down there, went back into the woods, and repeated the experiment. The direction the baby went the first time, she reasoned, might well have been chosen randomly.

It started upstream again.

She went another couple of hundred

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meters and tried it again, with identical results. The baby hadrosaur did the same thing on the next three repetitions. Paula threw her hands in the air. She untied the beast. "All right, I'm convinced. Upstream it is."

After less than an hour, she began encountering hadrosaurs browsing near the river. She did a silly jig when she first came across country she recognized, and was amazed to discover how beautiful a stretch of two-meter mud nests could be. From the nesting ground, she knew exactly how to return to the time probe.

For the last time, she put down the baby hadrosaur. She played the return-to-the-nest call, softly now so as not to disturb other dinosaurs. As it had all along, the hatchling knew where it was going. It had no trouble finding its own nest among the hundreds around it. Climbing in was harder, but the little dinosaur managed.

Paula never doubted it would. Though she would never know for sure, she was irrationally certain it would escape every Cretaceous predator and grow up big and fat and stupid, so that in the long run the beast's sad confusion about its relationship to her would not matter at all.

As she left the nesting ground, she felt a trifle sad just the same. After all, she had never been a mother before. ■

ON GAMING

(continued from page 95)

It also teaches cooperation while at the same time allowing players to compete against each other as well as against the computer. Finally, there is enough entertainment in the game that more experienced gamers will find it to be an interesting diversion while using it as a teaching tool.

If you want to find out how much you really know about science fiction, you may be interested in *Triveax* by Tessera, a new computer game that will really put you to the test ($39.95 at your local store, or direct from Route 6, Box 338, K-6, Columbia, SC 29210). Currently, the game is available only for IBM PCs, but a version is being prepared for the Commodore 64.

The two diskettes included in *Triveax* contain three separate games. The first, *Encyclopedia Intergalactica*, has one to four players attempt to score points by correctly answering questions. There are over 3,500 questions in the game. Points are scored for a correct response while a prompt indicates the answer was either partially or totally incorrect. Clues are given in sequential order to aid players, although more points are awarded if no clues are used to answer a question.

The *Galactic Survey* game is an advanced version of *Encyclopedia*, with 1,725 additional questions and answers in twelve different categories.

Beat the Dragon, the third game, is a "hangman" style game. Players must guess unknown phrases from the computer's dictionary of over 3,500 planets, galaxies, aliens, characters, ships, plants, and phrases. Each wrong answer gradually "transforms" the player into a dragon. When the transformation is complete, the player loses.

I wrote about a make-believe SF trivia game in the mid-December spoof issue last year. *Triveax* is a genuine trivia game for SF readers, and it's a real challenge. ■

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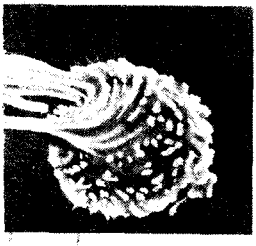
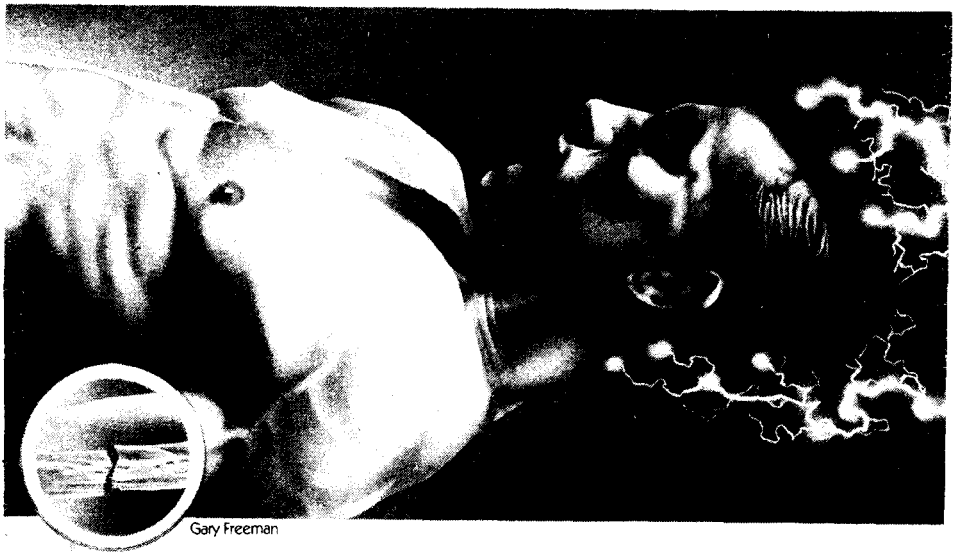
THE WHITE BOX

Rob Chilson
and Lynette Meserole





Gary Freeman

The Box was exactly what medicine has been striving toward from the beginning—or was it? There's one human malady that, by definition, no cure-all can cure. . . .

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"The Box does not cure infectious diseases. It merely masks their symptoms. If this isn't recognized, the gravest consequences could follow."

Gloria Bartram looked at Dr. Shephard where he slumped in his chair. He looked like one of those popular cartoons of doctors standing in unemployment lines, his face lined and hot. Did he really hope to convince them that the Box didn't cure disease, when none of them had been ill in years?

Silver-haired Carl Dunbar, for instance, Chief Administrator of Research Hospital, was one of the earliest cancer victims to be cured by it.

Or Harry Jackson, the Trauma Specialist and the only medical doctor on staff at the hospital, who might in other times have limped with an artificial hip joint.

Gloria herself had not had menstrual cramps in six years. And that alone—

"An interesting theory," said Carl dryly. "A lot of people around the world—at least a billion by now—would dispute it with you."

"I don't deny that the Box has many indispensible uses," said Shephard tiredly. "It's a genuine panacea for degenerative disease, and we even have regeneration of organs where there is even a scrap of the original organ left. But what makes you think the common cold is defeated?"

"The fact that I haven't had sniffles or sneezes in seven years, or my kids either," growled Harry through his untidy black beard.

"Tell me," Carl broke in. "Is this the line of the Fundamentalist Foundation? I have to tell you frankly that funding by them would make an associateship impossible here; the public reaction would kill us."

"I'll say," Harry grumbled.

Shephard looked at them tiredly. "No, that's not the line of the F.F. —Mark, tell them about the Foundation."

The small reporter had sat quietly in his corner of Carl's office. He made a self-depreciative gesture. "You know the Box was developed by some doctors who were doing research on faith healing, acupuncture, the placebo effect—"

"The psychosomatic effect," Gloria said crisply.

"Yeah. Lookin' for the physical basis of the psychosomatic effect. There'd already been doctors using electric current to speed healing of broken bones. Then someone discovered head-to-tail polarity—in fish, I think—and that when an animal is sick its polarity reverses."

"And if you re-reverse the polarity," Harry said impatiently, "impressing the electrical balance of health on the unhealthy, they heal much faster. That's the basic White Box discovery. We don't need a reporter to tell us that."

"I'm surprised," Carl said, "that you brought a reporter, even in an 'unofficial' capacity. I hope you don't think you can pressure me with the threat of publicity."

Dr. Shephard looked startled, then annoyed. "Mark has a right to see this through. He has been my assistant for the last two months."

Carl studied the doctor for a moment then nodded to Mark. "Go on."

"Well, a lot of religiously conservative folks couldn't take that. They held that faith healing was the province

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of God and God wasn't in no damn machine. The outcry was led by certain TV evangelists. Some big Holy Roly type churches came in enough to donate money.

"Anyway—maybe you never heard, but funds have dropped drastically, even from the Pentecostals. And as for the TV evangelists—it was one thing to denounce the White Box four, five years ago. But now—Those that rant loudest against the Box find their ratings slipping—and worse, their incomes dropping. Most of them have quietly dropped the campaign."

"I would expect fanatics to become more determined as they saw themselves losing," said Carl.

"TV evangelists are mostly fanatical about money and publicity. The real fanatics controlling the F.F. are just as determined as ever. But where's the money to come from?"

"So the Foundation is having to back off from anti-Box research?"

"Research? What research?" Shephard snorted. "The F.F. is a publicity organization, always was, and now that funds are not coming in, they can't afford frills like research. Who needs facts anyway?"

"So you've severed your ties with the Foundation?" Carl asked.

"They severed them for me. I never did see eye-to-eye with them, anyway."

Despite his reduced condition Gloria recognized the old Dr. Shephard. He had worked at Research before the White Box. He never did see eye to eye with anyone who disagreed with him.

"But where else could I get funding?" he added.

"So who provides it now?" Harry asked truculently. "I really can't imagine the National Institutes of Health or the National Science Foundation giving you a direct grant, after your association with the F.F."

Dr. Shephard hesitated, and for a moment despair mingled with utter weariness in his expression. With a visible effort he rallied himself.

"Actually, I wasn't applying for an associateship, but for a research affiliation. I'm prepared to submit my proposal to any competent board of examiners you name. In summary, I am engaged in research into the effect of the White Box on infectious disease. . . ."

Somewhere Shephard had had tact kicked into him. Gloria, despite all her old emotions, felt a pang of pity for him. His back was to the wall, and they all knew that this, his last chance, was no chance at all.

"I really am afraid that it would serve no purpose to examine your research proposal," Carl said, interrupting. "Despite its name, Research Hospital is wholly dependent on Federal financing for what research it does. Would any government agency be likely to accept any proposal that the press might construe as anti-Box?"

"You realize, Mr. Dunbar," said the doctor quietly, "that you're condemning me unheard? Yet if I'm even partly right it's of the utmost importance to every human being: the Box is our only medical treatment, for virtually everything."

"True. But considering that the powers of the Box have been pretty thoroughly demonstrated—" Carl shrugged.

Harry nodded. The big man looked

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relieved. Research already had two affiliate doctors, but like the associates they had outside financing and worked a number of hospitals; they were rarely seen. Dr. Shephard, with no such resources, was, in effect, asking to be put on staff. And Harry must have known his skills couldn't compare to the older man's.

"However, if there's anything we can do to help you—"

But what could they do? Medical research funds had dried up—after all, they had the White Box, didn't they?

"There is something you can do," he was saying grayly. "You can admit me. I'm sick."

Yes! Why hadn't she seen it? Those weren't pimples on his face, they were lesions. His face was heated not by emotion but by fever. The man wasn't just sick—he was seriously ill.

Startled, Carl retained his urbanity. "Certainly. What's the matter with you?"

"I've got smallpox."

She and Harry exclaimed; even Carl was startled. After a moment Harry bristled.

"How did you contract an extinct disease?"

"Extinct!" Carl looked at Gloria.

"Yes," she said. "The World Health Organization declared smallpox extinct in—1977, I believe."

Mark Nye watched alertly, unsurprised.

"So how *did* you contract a disease extinct for 18 years, Dr. Shephard?" Carl asked reasonably. "And are you sure you don't have, say, chicken pox?"

"It isn't only corpses that are buried in cemeteries," said Shephard grimly. "Gloria, maybe you've heard of the archeologists who caught measles from digging up an old Indian village."

"Dormant disease; yes, I've heard of such cases." She felt sick.

"We were studying recurrent malaise. But we did not assume it was a matter of becoming habituated to the Box. Our theory is that R.M. cases are infectious diseases whose symptoms are suppressed by the Box's therapeutic activity. Naturally most cases are things like flu. But one Texas boy had smallpox. Young Williams had recently helped relocate an old Rio Grande valley cemetery. The last outbreak of smallpox in the U.S. was in the valley in 1949."

Harry scowled, unbelieving.

"Weren't proper precautions taken?" Gloria's voice was shrill. "There are all kinds of regulations—"

Shephard grimaced. "Most have gone by the boards in this day of the universal panacea."

"We'll grant the possibility that you may have smallpox, then," said Carl, with a deceptively sleepy look in his half-closed eyes. "But why are you so sure the White Box won't cure you? You did save this boy's life?"

"Barely. The Box is as dangerous as the disease, in prolonged usage. You know how it works. Essentially by robbing Peter to pay Paul. But when Peter goes broke—"

Harry snorted, eyeing the doctor hostilely.

But Dr. Shephard was right. That was what killed Box abusers. The White Box actually regenerated tissue. But that required protein, minerals, vitamins, energy; and forcing the process was wasteful of them all. Too rapid and too

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frequent regeneration tended to use up the needed elements immediately on hand. Any of them could become a bottleneck. When that happened, the body started tearing down existing tissue to build new. And when the old tissue got too thin—

It was becoming standard usage to administer multiple vitamins the moment an abuser was diagnosed, and there was a special dietary supplement for any patient who used the Box on a daily basis. "Mouse milk," they called it at Research.

"But the Box rallies the patient's immune system," Harry argued.

"In cases of degenerative disease, yes," said Shephard. "But what proof have you that it does so in the case of infectious diseases?"

Carl looked at her.

Well . . . it was true that the White Box's reputation was earned on cancer, heart disease, and trauma. Gloria didn't remember any studies on infectious diseases.

"I'll have to look into that," she told him. "I don't believe it, but—"

Carl's eyebrows lifted faintly. "Just how contagious is this disease?"

Her heart bounded in sudden fear; Harry looked at the hand Shephard hadn't shaken.

"I was wondering when you'd ask that," Dr. Shephard said, grimly amused. "Highly contagious. Smallpox is transmitted by three different methods: airborne, direct contact, and indirect contact. It calls for *complete* isolation. And remember that includes blocking the airducts. It will take time to culture vaccines, and . . ."

"But saying the White Box won't cure it!" Harry exploded. "Bull! All we have to do is drink mouse milk and recharge every day till it's over."

"Congratulations, Dr. Jackson," said Shephard soberly. "That was one of my recommendations. I hope it works. Of course, all this time we will be contagious. With smallpox, there are normally no carriers. But with the help of the Box—And what other diseases are out there, masked by the Box?" Nodding to Carl, "I'm sure you've heard of Typhoid Mary."

Gloria shivered with horror. Smallpox loose in her hospital! She had an instant's image of Research dark, still, and shunned, its windows blinded.

But, if it *was* smallpox, the White Box would see them through. It always had.

Gloria escorted Dr. Shephard to 2914—a suite. He balked.

"My insurance won't cover this—"

Fortunately two-patient rooms were a thing of the past. The suite was a corner room, easily isolated. "Don't worry—Research will pick up the difference," she said.

"Get in bed. If you need help undressing—" He didn't. She stepped to the phone in the living room, called Elaine at Admissions, and told her to bring the forms up, but not to enter the suite.

"You seem to be taking me seriously," observed the doctor, collapsing into bed.

"Taking no chances," she said briefly. She'd seen epidemics of flu and meningitis, before the Box. Finished with the papers, she had a horrid feeling they should be boiled.

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She turned to the reporter. "We'll take over from here, Mr. Nye—and thanks. Now, you've been exposed to—something. So go to the dispensary and ask for a couple of bottles of the daily supplement. I want you to recharge whenever you have symptoms—fever, anything. If you are recharging daily, I want you back here."

"Do as she tells you, Mark." Dr. Shephard had temporarily given up the fight, was drifting off to sleep.

"I hadn't been planning to leave town," Nye said, deadpan.

"If you don't have access to a Box—"

"There's one at the office." He moved toward the door. "I've got some of Dr. Shephard's things in my car. . . ."

"You can bring them to the nurse's station."

He left with a nod.

Gloria brought in a White Box and hooked it up to the half-asleep patient, set it to calibrate, and hurried out to the nurse's station to give orders that no one enter 2914 without using complete isolation procedures. Therese nodded and Gloria presumed the news was already spreading among the staff.

In the age of the White Box bored patients visited each other routinely and called on new neighbors. She put up a NO VISITORS sign and hoped it would keep them out.

Dr. Shephard's calibration showed him to be quite ill, but not gravely so. His polarity had reversed slightly. The Box was probably reading the fever, plus minor tissue damage. Normally, fever patients were given a simple treatment, lasting perhaps half an hour, and were much improved by evening.

She programmed the treatment—and hoped he *would* be.

Afterward she washed her hands, using the old three-minute scrub technique.

Entering Carl's office, she slumped into a chair. Before her haunted gaze the vision of Research full of haggard smallpox patients was more vivid than ever. Her fingers trembled as she toyed with the crystal sculpture on his desk.

He hung up his phone. "What about Dr. Shephard? Does he have smallpox? Is there a danger?"

She hesitated. "I need to research smallpox. He definitely has something, in the early stages—Box readings aren't bad. I gave him a normal treatment, and he should be better tonight. If not—I put him in Suite 2914. I want him isolated. Even from what little I remember, he's right about how contagious smallpox is."

"Okay. I'll authorize the added expenditure if his insurance won't cover it. As for the medical side, I leave it entirely in your hands, as usual. What about adverse publicity?"

"I think we've handled it right so far—refusing to take him on as an affiliate—he was too sick anyway—but admitting him, and taking precautions in case his wild theory is true."

"What do you think of that?" He leaned forward intently.

"I'll be damned if I know," she said frankly. "He could be right. No one really knows the cause of recurrent malaise. Does the White Box kill invading organisms? Does it rally the body's immune system to do so? The idea that it doesn't is frightening."

"He better not be right," Carl said

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glumly. "We barely operate in the black as it is."

Back at her office, Gloria noticed the sign on her door for the first time in months:

GLORIA BARTRAM, R.N.
CHIEF MEDICAL CONSULTANT

Six years before, when she'd become Director of Nurses at Research Hospital she'd reached the pinnacle of her profession at the age of twenty-nine. Came the revolution of the White Box. Silicon Valley started turning out the breadbox-sized units in quantity—and four out of five doctors found themselves on the street. Nurses, med techs, and all kinds of hospital workers joined them as half the hospitals in the country went bankrupt. The nation now needed only fifteen percent of the hospital beds it once had. Doctors' skills were no longer required, and exceptional nurses could become the medical authorities at hospitals—despite the A.M.A.'s protests.

She hadn't completed rounds. As C.M.C., she saw only special patients, and those whom the researchers were studying.

The patient in 2901 was a young man who had tried to make his motorcycle defy the law of gravity. He was lucky. His only injury, besides plenty of bruises, was a displaced fracture of the left femur.

"Good afternoon, Alan," Gloria said. "How's the leg today?"

"As good as new. When do I get to go home?"

"First, let me check your readouts." Gloria unloaded a Box from her cart and plugged it in. Stretching the ribbon cable from the Box to the bed, she began connecting disposable cap and belt leads to him: one at the base of his skull and the other at the base of his spine. An unusual third lead ran to the top of his foot, where a window had been cut in his cast. Unlocking the Box's control panel, she pushed "calibrate." Presently it had completed a quick calibration.

"Looks good," she said, copying the readings onto his flow chart. "We'll be sending you home tomorrow."

"Smooth!"

"You'll have to have a treatment of decreasing length every day, and the cast must stay on until your x-rays show complete healing."

"How long will that take?"

"About a week."

"It's already been on for three days!"

Gloria smiled. "Before the Box, you would have been laid up for six weeks."

"Primitive. Do I have to come to the hospital for my treatments?"

"No, you can go to any recharge clinic. But come back here for the X-rays. Here's a disk programmed with your healing regime. Make sure the attendants put the third lead into the window of your cast—like it is now. You've seen us do it often enough—"

"Sure, no sweat."

"Need anything else?"

Alan grinned, shook his head.

Her next patient was Wayne Roberts in 2916. He had recurrent malaise.

R.M. had been reported early in the Box's history as a side effect and was still puzzling. Accepted theory was that it was habituation to the Box. Recharging gave one a feeling of sterling good health akin to that boasted of by long-distance runners, and R.M. patients

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were thought by some to be recharging on the least excuse.

Whatever the cause, the accepted treatment for R.M. was to discontinue use of the Box, plus prescribe bed rest, proper diet, and plenty of fluids. The symptoms varied but usually included a general rundown feeling, difficulty sleeping, mild fever. Then there was a whole pack of wild-card symptoms.

As there would be if R.M. was different diseases. Damn it, Gloria, concentrate on your patient.

He wasn't in his room. Before having him paged, Gloria read Dr. Li's notes. The doctor was studying R.M. No calibration today; the doctor was satisfied with yesterday's.

Mr. Roberts was probably in the kitchen, she thought, checking him off her worksheet. That would have been unheard-of in the old days, but these days a non-ambulatory patient was the exception. They were *all* in the difficult convalescent phase, and had to be kept occupied.

It was lunchtime. Often she ate in the cafeteria with the patients, but today she needed to talk to her aides, so she went down to the staff dining room. In the bad old days it would not have been possible for so many of the staff to be off the floor at once.

The staff dining room was small—only two tables—and comfortably plain. The girls came straggling in, seeming rather subdued. Therese was first to join her, Angie having taken her place on the station. Karen came over, and Linda Warren, the Chief Box Engineer.

"Where's Harry?" Gloria asked. "Gone out for a hamburger again? He should eat better—and less—"

"No, he's picking shot out of that fellow who was talking to his wife with his fist."

Harry did minor surgery; for major surgery they called in an outsider, or referred the patient to City Trauma Center. He didn't even need an anesthesiologist, merely a nurse; the Box could be used in an anesthetic mode.

"Is it true Dr. Shephard has smallpox?" Linda asked abruptly.

"That's what he claims," Gloria said. "We admitted him with Fever of Unknown Origin. I calibrated him and gave him a treatment; he should be better tonight. However, he's to be treated exactly as if he does have smallpox. Better to be safe than sorry."

"How could he even think he has smallpox? I've known some dumb doctors, but everybody knows smallpox is as extinct as dinosaurs."

"Next thing you know he'll be telling us he's seen a dinosaur."

"The cafeteria's been serving dinosaur steak for years," said Gloria.

They laughed, but still seemed nervous.

"Whatever it is, the White Box will cure him," said Karen.

"Yesterday I'd have agreed unquestioningly. Now—well, I hope it does."

"Boy!" said Therese explosively. "If the White Box *doesn't* cure him, Research will make the headlines for sure! Can you imagine the public reaction? If the White Box doesn't cure illness—"

"Of *course* the Box will cure him!" said Karen. "I never heard such nonsense. Name any condition the Box hasn't either cured or at least alleviated!"

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"Recurrent malaise, for one," said Gloria dryly, and Karen fell silent, troubled. Gloria looked around. They were all frightened.

Well, so was she. If they couldn't depend on the White Box—

"In any case, nobody—especially the Press—is to be told anything about this. We have a problem with Mark Nye, a reporter for the *Star*. He is associated with Dr. Shephard in his research. I don't know just how. Shephard insisted that Nye be allowed to accompany him here. Refer him to me or Carl if he asks questions. And the same with anyone else."

Therese spoke hesitantly. "I spoke to Nye a little, while I helped him take those boxes to the lab."

"Boxes?"

"Dr. Shephard's stuff, in dry ice, for the freezers. Nye wanted to know if you were—well, competent. Flexible and open-minded was the way he put it. I guess he's convinced Shephard has smallpox, and he's trying to estimate the kind of treatment Shephard will get here."

"Understandable." For a moment Gloria pondered herself. Did she have a mind open enough to accept that the White Box might not cure him?

"Okay, but from now on only Carl or I will answer his questions. Right?" They assented. "One other thing." She looked around at them again. "I want you all to recharge immediately, even if it isn't your usual time."

Hospital staff had free use of the facilities. Recharging was usually done monthly; never more often than once a week.

"I want you all on mouse milk daily, too. And if you start having any kind of symptoms, let me know *immediately*. Okay?"

Even Karen nodded soberly.

When at last her day was over, Gloria powered up her computer and requested the hospital library's catalog. The only things she could find on smallpox were a couple of news releases by WHO on the eradication of it. Well, not much had been written on the disease lately.

That might soon change.

With a sigh she got up and began to search her bookshelves. First the old standby, *The History of Nursing*. The index indicated it had a small section on smallpox. *The Textbook of Medical-Surgical Nursing* was too big to fit in her briefcase, so she laid it on her desk. *Using the White Box: a Nurse's Guide* went in also. Her copy of *Communicable Diseases* wasn't here; she'd get it out of the library, in case she couldn't find her own copy.

Carl Dunbar knocked and entered. "Debbie said you were about to leave. May I speak to you for a moment?"

"Yes, I wanted to see you." She closed her briefcase and laid it on her desk. "About Dr. Shephard."

Carl said, "I've done some checking on him, his records here and elsewhere, read some news releases from the Fundamentalist Foundation. I've also called up the *Star* to see if this Mark Nye works there; he does. I think Research could get some very bad publicity out of this. On the one hand, we mustn't be perceived as anti-Box." He grimaced. "Harry Jackson has been on at me about that. But he's right. The public believes in the Box, laughs at doctors, thinks

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medicines are as quaint and horrible as bleeding and purging."

"The public has reason to feel strongly about the Box, as no one knows better than we," Gloria said. "Miracles have become routine to us. It's no wonder there was such a reaction from religious types."

"But if the public feels that strongly, imagine the outcry if he does have smallpox and the Box doesn't cure him. That'd ruin us. Why, we'd have to close the hospital! And the publicity—the reaction against medicine—the Fundamentalist Foundation would make us all out to be agents of the devil—"

Worse than that was the image of themselves helpless with their only weapon, the White Box, struck from their hands.

"Yet if he's right, and that's what R.M. really is—infectious diseases," Carl continued, "the Box does seem to cure it. How many people die of R.M.?"

"None of my patients have," Gloria said. "Hmmm. I'll have to ask Dr. Li about that. Of course when there are few serious diseases going around, R.M. would naturally be colds and flu and the like. But the severe diseases would gradually surface and the death rate go up—

"—Carl . . . about Dr. Shephard. I just checked on him. I gave him a normal treatment before eleven this morning; he should be nearly well by now. But his temperature is going back up, and those lesions weren't healed. They are back to where they were this morning. The White Box *didn't* cure him."

Carl groaned in despair.

"Doesn't mean he has smallpox. I'm having him watched; we'll let the symptoms develop tonight and see what they indicate. But you're right about the public reaction," she said somberly. "I've given instructions to the staff not to discuss this."

"That's good. I've given a few orders too, but they listen to you better." Carl heaved himself to his feet. "I'm worried. I really am. I'm afraid we're going to get a black eye out of this on one side or the other."

Gloria watched him leave. She hadn't given that a thought. But if Dr. Shephard was right, it wasn't just smallpox that was going around. It was an epidemic of plagues. In her vision now, it wasn't just Research that was quarantined, it was the whole city—and if the Box were ineffective. . . . She saw the wagons come round, heard the cry, "Bring out your dead!"

And it all started here. "Get more than a black eye out of that," she muttered.

Gloria needed beer tonight. She stopped at the Bar and Grill, catercorner to the hospital, ordered it and a hamburger, and gradually unwound. She was drinking her second beer when Mark Nye loomed out of the murk.

"Excuse me, Miss Bartram, may I join you?"

Rather startled, she nodded, but braced herself.

"I'm glad we ran into each other. Tell me, have you decided whether Dr. Shephard has smallpox or not?"

"It will take several days to tell."

"What tests have you done?"

She looked at him in surprise. "None. We calibrated him, found him to be in not too serious shape despite that fever,

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and recharged him. He's not showing the progress I could wish, but should be well soon."

Nye cocked an eyebrow at her, but the waitress was there. He ordered a hamburger and Pepsi absent-mindedly.

When the waitress had gone he said, "Take our word for it, it's smallpox. Mind you, he had been exposed before he realized what was going on, and he took heroic measures to keep other people from being exposed. The pox didn't develop till this morning—he knew he was cutting it fine, but he wanted to come back to Missouri for treatment."

Gloria nodded. "Still, exposing all of us was certainly an effective means of making his point—if he's right."

"He didn't want to expose anyone. He was counting on not being contagious until the pox appeared, though he warned me that that didn't necessarily apply to me. What other choice did he have? He knew that if he didn't present you with a full-fledged case of smallpox, you wouldn't believe he had it. Hell, you don't believe even though you see the symptoms. Without them—if he'd been on the Box—you'd just say he had recurrent malaise. Not only would he probably die from improper treatment, but many people would be exposed before you made up your minds to it."

Troubled, she had to nod. "Make sure you get back here as soon as you begin to show symptoms." She looked at him over her stein.

He nodded, but looked at her curiously. "You know, you're a strange combination. You refuse to believe he's got smallpox, yet you act as if you believe he does."

"Taking no chances. Listen, he's got something."

"But if he's right in that, why not in his belief that the White Box won't cure him?"

"He may *be* right," she said. "But the burden of proof is on him."

"True." Nye was still curious. "Still—didn't you ever wonder why animal polarity reverses during illness?"

"The illness causes it." She tried to conceal her impatience.

"And fever—does illness cause that?"

"No, that's the body's attempt to kill the disease organism." She looked at him. "You're saying there's a connection?"

"Not me, Dr. Shephard. Apparently the first thing he thought when he heard of polarity reversal was, why does it happen?"

The thought had not occurred to her. She had taken it for granted; it happened. But Dr. Shephard—and he had a point, she admitted. What if the polarity reversal was a part of the mustering of the body's immune system?

Gloria pictured infectious organisms attacking and destroying tissue, causing the patient to feel a malaise. He goes on the Box and the damaged tissue is replaced at a slight cost in energy and raw materials. But what if, without polarity reversal, the immune system cannot kill the organisms? They would survive and again attack tissues, again producing malaise.

It all made horrid sense—but she resisted belief.

She'd always respected Dr. Shephard as a researcher. But having the courage to refute accepted beliefs didn't make his theory true.

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He'd always been an arrogant son of a bitch.

"I suppose the calibration told you—"

"Only that he had a fever." Troubled, she added, "Diagnosis is obsolete, these days. We need merely know the symptoms, to know how to set the Box to reverse them."

"So how do you find out what he's got?"

"I propose to find out tonight," she said, gathering up her purse.

She sighed in relief when she entered the apartment door, then again in weariness at the morning's mess. At least she didn't have to cook. Half an hour spent straightening and cleaning and she refused to do more.

She pulled up a table, set out beer, looked wistfully at pretzels but instead sliced apples and cut up celery. Despite the Box she wasn't getting any younger, and her hips tended to expand. The beer was bad enough.

Then she plunged into the books.

First she scanned *The History of Nursing* and the *Textbook*. Then she settled down with *Communicable Diseases*. Her scalp prickled.

Two forms of smallpox existed: variola major and variola minor. There was no known cure for either. Variola major had a death rate of about 40 to 50 percent among the unvaccinated.

How many of the hospital staff had been vaccinated? She'd have to find out. Reading on, she decided grimly that it didn't matter, for vaccination had to be repeated at three-year intervals to be effective in high risk professions.

Everybody at the hospital, staff and patients alike, was at serious risk. For a moment she seethed with hatred for Dr. Shephard.

Could they be vaccinated—in time? Where was vaccine stored—anywhere, in this age? Even if it were stored, would there be sufficient quantity? If not—would there be time to cook some up? Hopeless, she feared. The incubation period was 8–17 days after exposure.

Shephard was right about the methods of transmission and the period of comunicability. He would remain infectious—if he lived—till all the scabs were gone. Symptoms—

She turned on the lamp beside the couch and remembered her beer; her mouth was dry. Symptoms— Onset was abrupt, with headache, backache, chills, and fever 103–104°F. Eruption on the third day after onset, consisting of one crop of papules, heaviest on extremities, face, and scalp.

Dr. Shephard's symptoms, so far as she knew them, tallied perfectly with smallpox's.

Complications—she settled down with a sigh and read through them, taking notes.

Treatment—back to *Textbook of Medical-Surgical Nursing*. Isolation till all scabs are gone. Antibiotics to prevent secondary infections—the *Textbook* was pre-Box. Where on all Earth could she find antibiotics? The drug companies had converted their factories to other uses—some had been dismantled.

"The Box had *better* work," she muttered.

General supportive measures: medication for pain; hydrotherapy for fever. The White Box would be more effective. She checked with *Using the White Box* and made notes of variations in

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usage for chronic pain and fever. She remembered Shephard's response to Harry's suggestion of dietary supplements and the Box. If necessary, she'd start an IV on him. She'd already prescribed "mouse milk."

Further treatment—quarantine all contacts and vaccinate. Burn all disposables having contact with oral or nasal discharges, boil all bedclothes.

I hope to hell the Box cures him, she thought.

But what if it didn't? This morning's treatment hadn't. Gloria put her face in her hands. She remembered—how like drowned corpses the hints came back! —"catching" R.M. from a patient. At least that was how she now interpreted it. He'd had it; she'd been near him; then the following week she also had it.

Shephard's theory just could be true! If she had died, would she have been diagnosed as an abuser? "Everybody knew" R.M. didn't kill.

Even now this deadly disease might be spreading through her hospital —maybe through the whole city. Uneasily she felt she should have seized Nye, shouldn't have come home herself. Yet—maybe this was merely a waking nightmare. Surely all would yet be well.

She carried an image into sleep with her: Louis XV of France, who died of smallpox, his head swollen to twice normal size, decaying alive so that the usual autopsy was discontinued because of the smell.

Linda Warren was waiting for her in her office when she got in. The Chief Box Engineer had a worried look.

"It's about Dr. Shephard."

Gloria said, "I was afraid of that."

"You ordered the girls to keep a close eye on him last night, when his first recharge did so little. He's much worse this morning—and has more papules."

Gloria's head started to throb. She remembered the pictures she'd seen. "Fever? Aches? Rapid pulse?"

"Yes. He's got all the symptoms of smallpox. I did some research."

"So did I," said Gloria, dropping her purse into her desk drawer. "White Box ineffective? Or just not a prolonged enough treatment?" Increasing the wattage of the current above the optimum was ineffective; length of treatment and pulse rate were the critical factors.

"Well . . . I don't know. I ordered a thorough calibration, with the main computer on line—it's talking to the bedside Box through the phone now. That should tell us what to do. Uh—what about diagnosis?"

"We'll do a fluorescent antibody test this morning. As for specific tests—the virus can be seen with an electron microscope, though with difficulty: But is there still one in Kansas City?"

"I don't know."

"There used to be one at the K.U. Med Center when I was there years ago, but I imagine it was shipped back to Topeka when the Med Center was shut down. Hm-m. I'll call around. Meantime I'll take a blood sample and culture it. That'll take two days. We'll also do a wound culture."

Gloria called the lab, which was surprised. Only researchers called them anymore.

"Trouble is, there *is* no test for smallpox," she was told. "The fluorescin test

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will just tell you if there's virus or bacteria there. Or you can look for the virus with an electron microscope. Frankly, with smallpox we go by the symptoms. One is a high death rate."

She grunted. "If that's your idea of humor—"

Gloria slipped into an isolation gown and drew a mask over her face before entering Dr. Shephard's suite. He was weak, obviously feverish, and had a fiery crop of eruptions across his brick-red face and up his arms. "Good morning, Gloria. I mean, Nurse Bartram." His dry lips cracked as he grinned, as feebly as he spoke.

"Good morning, Dr. Shephard," she said, concealing her shock and horror. This was worse than she had expected. No question that the White Box was ineffective. Gloria felt sick. "I see you're being calibrated. I need to examine you."

"Very well." He didn't seem very interested. Occasionally a low moan escaped him when she flexed a limb. When she had finished and drawn a blood specimen, she pulled a culture swab out of its plastic tube.

"One more thing," she said, and touched a couple of the worst lesions with the cotton swab. When she had labeled both blood and wound samples, she wiped his sweating face.

"Textbook case of variola major," he said, his voice little more than a croak.

"Perhaps," she said, having read a number of textbooks but not willing to tell him that. The computer had finished its calibration; Gloria hung up the phone.

"We're going to prescribe a treatment for you as soon as Linda has evaluated your calibration. That and plenty of nourishment should keep your strength up as well as any treatment for smallpox in the nursing handbook."

He shook his head feebly. "Nobody hopes you're right more than I do. My life's *riding on your judgment*. Hope you don't get it yourself. You were the best nurse at Research . . . how come you never got married?"

"I did." Startled. "It didn't take."

"Neither did mine. Never marry someone who thinks you're glamorous. Research isn't glamorous . . . important, is all. . . ."

Even in the day of the White Box, she thought.

The phone rang, making her jump.

"Gloria, you wouldn't *believe* how bad—guess you would. You're with him. His polarity is much more negative than yesterday—your treatment might never have been given! I can't believe it, even after his poor response yesterday. Here are the settings—and the time! Ninety minutes! But I agree with the computer—he's not as bad as a terminal cancer patient, but this is progressive, much more so than cancer."

Gloria repeated back the settings as she made them, checked to make sure the electrodes had good contact, and turned the machine on. Automatically she locked the controls in position and removed the key.

Dr. Shephard looked at the Box with a mixture of hope and doubt. "The almighty White Box! *Physica ex machina*. Heal me, machine—if you can. If that doesn't work, you can put me in a black box. Wrap me in nine yards of white cloth—"

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Gloria peered into his face and he grinned crookedly again. She made a mental note to bring him something for those lips. "No, I'm not delirious. —Yet."

At the nurse's station Gloria gave the blood and wound samples to Karen with orders to rush them to the lab, and did a three-minute scrub. Angie was on duty at the station. "Listen, you've got Dr. Shephard on your TV monitor—keep an eye on him. Don't go in there except in emergency. I'll take care of him—and I can't go near any other patient until this case is over."

She fell silent as a patient came up and asked Angie if he could go out into the grounds for a picnic with his family that afternoon.

"Not going to be easy to stay away from patients who roam the halls," Angie said.

"I'll have to stay in my office as much as possible."

Gloria immediately returned there and called Information in Atlanta. Linda entered just as she had acquired the number and started to punch it out.

"Here's a hardcopy of Dr. Shephard's calibration," Linda said without preliminary. Gloria stared at it in fascination. She'd seen worse—she'd seen terminal patients lifted off their deathbeds, trauma patients walking again who should have died—but this was the worst she'd seen in three years, now that City Trauma Center handled the bad cases.

It seemed worse, knowing what she feared.

"You want to recharge him again this afternoon? Okay. We'll need to start an IV. He hasn't been eating enough to keep a bird alive. Would you tell Angie to bring the equipment up from the Trauma Clinic? We'll need a thousand-cc bottle of ten percent glucose with vitamins. I also want to administer gamma globulin. We'll need to continue the IV unless the Box has a massive effect."

"It will. It always does."

Gloria looked at her. Linda was as frightened as she, despite her brave words. "Even so, we'll be ready. Mind calling research institutes in the metro area to see if any has an electron microscope?"

She was shaking her head and hanging up the phone when Carl knocked and entered.

"Bad news," Gloria said, drained already though the day had only begun. "Center for Disease Control in Atlanta; they can't help us. It takes two weeks to cook up vaccine, and no civilian research facility in the U.S. has any of the virus—oh hell."

Carl sat down, looked at her soberly. "Well, if he really does have it."

"He has all the symptoms—it can't be anything else. It's not so incredible, Carl."

"One point is—that the White Box won't cure it. Here's another thing that's not incredible—he could be faking the whole thing."

Gloria looked at him. She couldn't speak.

"Look, you used to work with him. What kind of man was he?"

After a moment she said, "You've heard some variant of the joke whose punch line is, 'Oh, He really *is* God. Trouble is, He thinks He's a doctor.' Shephard was that kind of a doctor. It

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couldn't have been easy for him to be replaced by a goddam *box*."

"Arrogant? Grand-stander? Trouble-maker?"

"Arrogant as the devil. Not a grand-stander, exactly."

She had hated him. She was not exactly a beginner as a nurse when she came to Research, but she was much younger and lacked the self-confidence she now had. And Dr. Roger Shephard, damn his whites, could've shaken up any but the most experienced floor nurse.

"He was a good doctor," she said. "He couldn't stand to be wrong—and he was usually right. No question but he was brilliant; Research was proud to have him. But his bedside manner was terrible, nontherapeutic; he treated patients like *things*. And he hated to admit his mistakes."

Carl had listened intently. "That pretty well confirms my opinion. Harry brought me these clippings. Perhaps Dr. Shephard isn't to be trusted too far." Carl handed her a manila envelope full of photocopies and started to leave; swung back. "Oh, yes, Harry got a glimpse of Nye's neck yesterday afternoon. He says the man's a Box abuser—typical port-wine markings. Possibly *he* has reason for casting doubt on the Box?"

Startled, she could only say, "Not a typical reaction for an abuser."

"Maybe he's trying to get off and hates it. Anyway, possibly we might quietly inform the newspaper editorial staff that he's an abuser? That might discredit him?"

It revolted her. To think that Carl of all people would stoop to this kind of cheap blackmail! He was frightened, she realized suddenly, and she was frightened herself at the thought of it. "Probably backfire and discredit *us*. We'd seem desperate to shut up word of what's going on, and they'd suspect a cover-up."

Carl wasn't too blind to appreciate that. "Hm-m. Well, we'll not mention it to them—yet."

Gloria sighed and reached for the envelope as the door closed behind him. She was interrupted ten minutes later by a call from Linda.

"Gloria? We found an electron microscope. It's at Veteran's Administration. Want to talk to Dr. Sanderson?" She gave her a number. "Oh—did the lab get through to you? They found a virus in Shephard's blood. Got that? Of course they couldn't identify it, but—"

"I got it, but good."

She punched the number and at last Dr. Sanderson came on. "Yeah, man, what can I do for you?"

"Gloria Bartram, R.N., C.M.C. at Research. You have an electron microscope? We have a possible case of smallpox—"

"*Smallpox?*"

Gloria explained. "And our lab confirmed the presence of a virus in the sample. We need another diagnostic test. We're doing wound and blood cultures for EM examination—"

"Yeah. Man—'mean, Woman—that's a mess. Look, just where is Research? I'll be right down there, or send a messenger, the minute you call and say your cultures are ready. A couple of days, right? We could take a look after twenty-four hours, but two days is better, you know? I'll give you the fastest and best

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reading—you got the best damn EM operator ever hatched on this line, and—" subdued, "you know it's barely going to be possible even so, don't you?"

"You know what the virus looks like?"

"Yeah, studied it in school—'course I don't remember, but there's micrographs around here. In books and like that. Listen, be careful. Like I say, I studied that one in school, and it is *mean*, what I mean."

That was one doctor she'd like to meet. Gloria punched numbers again. "Carl? Just talked to Veteran's Administration. They have an electron microscope. Apparently they don't just do research on limb regeneration: some of them know about pathogenic organisms —Oh yes . . . the lab just confirmed virus in Shephard's blood. I'll keep you informed."

"What about the clippings?"

"Haven't had time to get through them." In truth, she didn't know what to tell him.

Harry must have spent the evening in newspaper morgues instead of researching smallpox. These clippings were of news stories about the Fundamentalist Foundation, and each quoted Dr. Shephard briefly. In the older ones he merely voiced a general fear that mankind was rushing into trouble without reflection; later clippings had more specific warnings, badly garbled. Somehow the press had never understood the distinction he was making between degenerative and infectious diseases.

It was time to unhook Dr. Shephard from the Box. He was vastly improved under its treatment. He seemed quite normal but for the lesions on his face and arms. They had faded to dull red, but were still there. That she didn't like. Maybe they'd vanish after this afternoon's treatment.

"Hungry?"

"No."

"Eat anyway; your system has just had a shock."

He sighed. "Something light, then."

"Something full of protein, Doctor," she said firmly. "Also minerals and vitamins."

He sighed again, said, "You're the doctor, nurse."

"Damn right, doctor, and don't you forget it." No nonsense.

He laughed, seeming very young and vulnerable. "I hope you get your staff vaccinated soon," he said.

"I hope so too," she said grimly.

"Oh—sorry, I forgot—you're the doctor."

He seemed content to leave the worrying to her, a common syndrome with patients. He was far from well yet. As for vaccination—she'd thought of using him as the source of live virus for the Jenner technique of inoculation. But that was dangerous, with a better than even chance of contracting the disease.

She left him sipping chicken soup slowly under the eye of the monitor, which he dubbed "Big Sister." Back in her office she considered the clippings. Well, she thought, Harry was badly frightened. Like all of them.

Better doctors than he were "ambulance-riders" these days, doing medtech work.

There was a knock, and when no one

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entered, she called, "Come in." It was Dr. Li. "Can I help you?"

He was uncomfortable. "I hear Dr. Shephard has smallpox. How could that be?"

She explained tersely.

"That could be." Li took a breath. "And he says the Box won't cure him?"

"So far it hasn't. I'm convinced he does have smallpox." Expressionlessly she advanced the doctor's thesis and added that his own case seemed to bear it out. "If it's true, or even partially true, it changes the face of health care—again. Doctor, *is* there such a thing as a recurrent malaise?"

Li was stricken; it was his specialty. "Damn if I know! It looks as if much of it must be disease. But might not *some* of it be a matter of becoming habituated to the Box? And some might be, say, hypochondria?"

"We've done a fluorescin treatment and found an unidentified virus in his blood. And that was after one treatment. What does that look like to you?"

By his expression, it looked bad. "I think I had better do blood fluorescin tests on each of my R.M. patients," said Li slowly. "If they *do* have infectious diseases—

"And if you need help with Dr. Shephard—" he said on his way out. "I was young, but I saw a case of smallpox in my country as a boy. I remember."

Gloria took her textbooks and made copies of the relevant passages on smallpox and its treatment. She was collating them in her office when the phone rang.

"Center for Disease Control, McLeod. Nurse Bartram?"

"Yes."

"We've been doing some consulting, and nobody in North America has smallpox—or will admit it; some may be hiding behind military security, but I doubt it. We're about to start calling Europe and India—but before we go to the expense—our budget never was much, and these days—"

"Quite. Well, we still have no proof that would convince a Congressman, but there is no doubt in my mind. We'll be quarantining the hospital soon. As for tests—VA will do an electron microscope exam for us when we have positive cultures."

"Hm-m. Okay, we'll go ahead on the strength of that. If you're ready to quarantine, it's pretty positive."

"Thanks for sticking your necks out for us."

"Well, confidentially, your Dr. Shephard isn't the only one who's wondered about recurrent malaise. We've been keeping an ear open—no one seems to dare publish anything on the subject, but rumors of research and various theories are flying."

She ended the conversation quickly. A knock: Mark Nye entered.

"Sorry to bother you, Miss Bartram, but I thought you'd want to see this."

It was a hardcopy of a newspaper story—apparently one he'd filed. RESEARCH ADMITS SMALLPOX PATIENT, was the heading. Below was a cool, restrained story, sketching the facts briefly, then going into Shephard's theory very lucidly. The article closed by observing that "officials" at Research had not yet been convinced that the doctor's self-diagnosis was accurate, but that proof would no doubt shortly be forthcoming.

Quiet, restrained, but a bombshell.

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"Thank you," she said. "What can I do for you now, though?"

"That's good—I expected you'd be hostile." He looked at her. "Is it smallpox or not?"

Gloria hesitated, balancing one fear against another. How could she *know* if he had smallpox, when there was no specific test. But the newspaper wanted a yes or no answer. Stick her neck out and publicly say that the White Box was ineffective . . . ? If people *did* believe, there was the fear of a panic. Yet if she did nothing, smallpox might run wild and wipe out thousands. . . .

The abyss opened before her like a grave, waiting.

"Yes," she said reluctantly. "Mind you, we still can't prove it, but no medically trained person would doubt it for a moment. As for whether the White Box will cure it or not, we'll soon know—we gave the doctor a massive treatment this morning."

"May I quote you on that?"

In for a penny, in for a pound, she thought wanly. "Yes." She told him about fluorescin tests and electron microscopes.

"I'd really like a formal interview with the doctor," he said, folding his notebook away.

She frowned at that. "You've already been exposed, but let's not be foolhardy. How about a phone interview?"

"I need pix. I have a photographer in the car. He could stand in the outer room. He's already got some shots of Research."

Gloria held her head. Carl would have kittens. "No," she said. "He's under quarantine."

"It's going to be all over the papers, and TV too. This is *big*, Gloria. As soon as my first story breaks—it'll be in the *Star* this afternoon—half the reporters in town will descend on you."

"Oh, God."

"Sorry. But I'd like to be in the front ranks. You can't let me into the room? Hell. Then, what more can you give me now for tomorrow morning's *Times*?"

"You can quote me, identified as the hospital's Chief Medical Consultant. I don't know whether Carl will talk to you or not. No one else will; orders. Please don't harrass them."

Nye got out a pocket recorder and questioned her tersely about the case and what she was doing about it. She indicated that she had "heard" that CDC in Atlanta had turned up no smallpox cultures in North America and were calling overseas.

"I'm impressed," he said, pocketing recorder and notebook.

"I hope you are," she said bitterly when the door closed behind him. "We want to keep the publicity as favorable as possible."

She took the news story to Carl's office at once. He was stunned. "What can we do about this?"

"Cooperate," she said, surprised. "Anything less than full cooperation will look like a cover-up. I'd like you to give an interview, if only as an unnamed Official Source."

"What! After they've put our name in the headlines? A better response would be to call the *Star* and tell them their star reporter—hah!—is an abuser. In fact—" Furious, he seized the phone.

"Carl!" she said, angry and frightened. Then, to her dismay, she started to cry.

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Carl was shaken. He dropped the phone, said, "I'm sorry—" But it didn't help; she couldn't get control. Coming around his desk, he knelt and took her hand, murmuring soothing nothings.

"It's all right," she said, recovering. "Just a spasm. But you were about to do the f-first dumb thing I've seen you do as an administrator."

"Um. Maybe you're right." He looked sick, but seemed to be recovering his own self-control. "You realize, though, that patients will stay away from Research in droves when the news gets out."

"I would hope so, with smallpox on the premises! Quarantine is the legal requirement in most states—or was. Legally required or not, we've got to declare it—immediately. And if we handle it well, it'll be good for us."

"This'll be the ruin of Research," Carl said, glum. "I don't care what you say, no matter how we handle it, Dr. Shephard's ruined us. You're *sure* he has smallpox?"

"Positive. The symptoms are enough. The quarantine?"

"Right," he said, not meeting her eye. "I'll make an official announcement later today. Meantime, do whatever you need to do."

What she needed to do first was to call City Trauma Center and tell them not to send any more patients. Until the official announcement was made she preferred not to tell them why, merely gave "lack of capacity" as the reason. Then she called to ask her sister to clean out her refrigerator and pack clothes for her.

Vicky, one of the assistants in the Trauma Clinic, was at the nurse's station when Gloria informally declared Shephard a smallpox patient and ordered his room quarantined.

"Gloria, when I was a girl I was vaccinated for smallpox three times," she said. "Doctors said the reason it never took was that I was naturally immune."

"You can't be sure."

"No, but it's a good chance. Why don't I change with Joyce, nights, and look after Dr. Shephard when you're off duty?"

"Well—if you're willing to risk it—" It was true she couldn't be on duty all the time.

Word was not slow in reaching the patients, and presently there was a cluster of them milling around the nurse's station. Gloria was only surprised that it had taken so long. She paused on one of her periodic trips past the station.

"Mr. Roberts!" she said, seeing the big man on the outskirts of the group. "Would you spread the word among the patients that there will be a briefing for all patients in the rec lounge in fifteen minutes?"

Apparently all the ambulatory patients in Research were there at the appointed time. She made a terse announcement of Dr. Shephard's condition and the dangers involved.

"The White Box will cure him, won't it?" someone called.

"That is our hope, but so far it has been ineffective. We dare not take chances. You may be exposed if you remain here, and frankly I urge any of you who can to leave immediately. I have instructed our staff to facilitate that. Those who are not able yet to go

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home, we will find room for at other hospitals."

At lunchtime most of the girls were busy helping patients leave. Gloria decided to join Dr. Shephard for the meal.

He was sitting up in the outer room, wearing gaudy pajamas with green shamrocks all over them. He seemed in hearty good health, the flush gone, the fever gone, most of the lesions gone or dull, dry, and shrunken. Well, the treatment he'd received would have revived a corpse. Looking at him critically, though, she thought that already the fever was creeping back up on him.

Gloria watched him anxiously as he ate and read Nye's article. He ate too little, much too little to please her. A consequence of frequent Box use was loss of appetite.

"Good man," was his only comment.

"You know, I suppose, that you officially have smallpox."

"Tests on the cultures have come in?"

"Not yet, but I don't need them. I've quarantined this suite, and the hospital will soon be quarantined. Unofficially, it already is; we're turning away patients, and sending those we have away."

There was relief on his face. "Good. That was the thing that I feared most —that you wouldn't believe till too late."

"Smallpox we could believe in. That the White Box wouldn't cure it—that we resisted."

"When do you treat me this afternoon?"

"Late, and probably only an hour's treatment. It's a shock to the system, and you're not eating much. In fact—" she indicated the half-pint bottles of dietary supplement on the tray and he grimaced, swallowed some.

"What's your prognosis?" he asked suddenly. "You think I'll make it?"

It was too early to say. "Oh, I'd say so. The Box *is* a powerful tool. I'm worried more about abuser's debilitation."

"When I was young my ambition was to discover a new disease and have it named after me. Childish, huh? Guess I'll be famous enough, now—but who'd have thought it'd be for rediscovering an old disease?"

"It'll be for discovering the deficiency of the White Box," she told him. "I thought the Box would make medicine what every nurse wants it to be—a humane art. —And it did. It may have limits, but it has still changed our lives."

"True. Doctors got maybe too much—reverence, in the old days. Didn't realize it till I found out I was glamorous. I wound up married to a blonde with a Porsche, and then divorced with a surprised look on my face. Scared the *whey* out of me, that Porsche did." His expression was wry. "One thing, if I survive, there'll be no trouble finding funds."

Not long after lunch Gloria received a call from Dr. Li, at St. Joseph's. "Gloria, preliminary reports from the lab here are that two-thirds of my R.M. sufferers have some disease, viral or bacterial. But what about the other one-third? Is recurrent malaise a disease or not?"

"How would I know? Wait. Maybe

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the one-third have already recovered from their diseases."

"Great minds think alike. Put the theory to Dr. Shephard, will you? Hm-m. I wonder if some abusers don't get started because of colds. It's as good a theory as the ex-alcoholic/addict one."

Harry Jackson came in without knocking while she was talking to a reporter for a radio station. "We're quarantining the hospital," she said, "and have sent all patients home. There is danger, but we think we can contain it." She hung up, lifted an eyebrow at him.

"Gloria, are you really going through with this—quarantine and all?"

"What else can we do?"

"You're that sure he has smallpox?"

"No competent medically trained person could doubt it." Instantly she regretted that, but he didn't take it personally.

"Well, I haven't been following his case; I'll have to take your word for it. And the White Box?"

"In a word, ineffective."

"I can't believe that, Gloria."

"Harry—you'd better. Man, you have a family! Did you think you were going home tonight?"

The question obviously hadn't crossed his mind.

"Possibly you're okay; you didn't get too close to Shephard, or touch him. But you're not going home. As soon as the quarantine is announced, you check into a room, you hear?"

Harry opened his mouth, closed it. He left, shaken.

It seemed very quiet with the patients gone. Nobody had walked by her office door in twenty minutes, except for Harry. She heard no electronic howls from the rec lounge, no TVs murmured in the distance. Research—blind, deaf, and dumb. After a bit she realized she was listening for the sound of the dead wagons.

Pushing the paperwork away, she stood up. It was too quiet in here. Face it Gloria, she told herself; you're scared. I hope nobody took smallpox with them when they left!

She went down to Admissions where, again, it was quiet. Nearly all the patients were gone; the few remaining were awaiting ambulances.

"Call a staff meeting, will you, Elaine? And get ready to assign rooms to all staff members who went near Dr. Shephard. Others we'll send home. Order the cleaning company and the food services company to keep their people away; we'll do what cleaning and cooking we'll need for ourselves."

The staff meeting was announced over the intercom and they gathered in the rec lounge. Gloria frowned when Carl Dunbar's secretary reported him out of the building. Carl was definitely included in the quarantine—he'd been closeted in the same room with Shephard for half an hour.

"Well, Gloria, when is the quarantine to be announced officially?"

Gloria felt her cheeks go pale. *That* was why the hospital was so quiet. No reporters! No TV cameramen clamoring at the gates! Scarcely a phone call. The news services were holding off, waiting for the official announcement. Carl!

"I will make the announcement immediately," she said, furious. "Elaine, if you'll call the radio and TV stations and newspapers—I'll type up an official announcement for you. Now, some of

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you know for sure you have been exposed. Some may be in doubt. If you're in doubt, see me—I'll review your contacts and make a decision. If you haven't been exposed, I'd prefer you at home. If we need more help here than we have staff who have been exposed, we'll call for volunteers—later."

Yvonne asked, "Are we closing the recharge clinic too?"

"Yes," she said firmly.

There were other questions and debate over how to do what had to be done, but no argument. It was a subdued staff who looked back at her. Even Harry made no objections, though he still looked unconvinced.

When they broke up she went to her office, sat with a sigh. One detail had come up that she hadn't thought of—she called the company that provided their security, told the president of it the situation. "We'll ask the police to station men outside—we will make arrangements for deliveries." Food, for instance, would have to be sent in.

Now, where the hell was Carl?

She called his home, but his wife had no idea. "Maybe he's gone shopping?"

Gloria seethed, but could do nothing but wait.

Oh yes, one more call to make. Someone at the newspaper located Nye and brought him to the phone. "Nurse Bartram, Research. Mark, what kind of story did you get?"

"All the essentials, thanks to your cooperation. I've just been doing the breaker about the quarantine." He didn't seem too perturbed. "That'll hit tonight's paper and the nightly TV news. Have the cameras gotten there yet?"

"Uh—what I mean is, are we going to be—uh—criticized?"

"Hm-m. Shouldn't think so; we were so busy getting the story we didn't make judgments—and I was impressed by your responsiveness. By the way, can you tell me anything about Dr. Jackson? Is he a troublemaker?"

Gloria stifled a hysterical giggle at the repetition of this question. "Not as such, but he may have done something ill-advised."

"He spent last night at our morgue, and there have been hints that I'd better lay off or else. I don't know they came from him, but—"

"Possibly. Tell me, do you have abuser's lesions on your neck?"

"Why, yes. Is it important?"

"Well, if you're an abuser, maybe the newspaper could be, say, threatened—or panicked; who can trust a story filed by an abuser?"

"Ridiculous! Would you care for a copy of the news story I wrote telling how I became addicted and was cured by Dr. Shephard? I can fax it to you if you have the equipment."

They did. Gloria looked up the number and told him to go ahead and send the article.

"So that's how you met Dr. Shephard."

"Yeah. It started as a simple case of R.M., but then I found I was hooked on the Box. I'd been readin' about Shephard's work at the F.F., so I went to Oklahoma City. Shephard never did figure out what disease that R.M. represented."

"What I called you about—we're officially quarantined—and that includes you. I want you here as soon as

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possible, and prepare for a lengthy stay."

Gloria went down to the communications room for the article and read it with interest. Angie found her there.

"Gloria! A mob of reporters and TV cameramen are outside, and Carl Dunbar walked into it! He's madder than hell!"

"Not half as mad as I am!"

She went by a front window and peeked out at a cluster of people, some of them technicians. As she watched, one camera was trundled off.

Carl was in his office, furious, his coat lying on the floor. "What did you mean by announcing the quarantine? I told you I would do that—"

"When? Next month?"

"When I was convinced that we did indeed have a medical emergency here—"

"When *you* were convinced? When did you become a medical authority? That was my decision. I made it and went through channels—you. But when you didn't move, I took the necessary action."

"You had no evidence but the word of a sensation-mongering journalist and a publicity-hungry doctor. Both of them tied up with the Fundamentalist Foundation, which would do *anything* to discredit the White Box! The whole thing's probably a fake—"

"Forget that, Carl! Nobody could fake those symptoms well enough to fool me! And as for Nye—"

She handed him the article about Nye's addiction. Carl scanned it, angry, and shrugged. "Just because he's known to be an ex-abuser doesn't make him a responsible reporter. A sensation-monger is—"

"Sensation-monger!" It came out nearer a scream than a shout. "I've rarely seen a better piece of reporting than that news story I gave you earlier. He treated us better than we deserved! Do you remember our reception of Dr. Shephard? I do! I tell you that he has been proven out to the last iota! He *does* have smallpox, which is a terrible disease and we are all threatened by it and by the inability of the White Box to cure it. It would be irresponsible of a reporter *not* to tell the public that!"

Carl shook his head stubbornly. "A responsible reporter has a duty not to panic the public—"

She slapped his desk.

"Our duty as responsible *health-care specialists* is to protect the public, and quarantine is the first line of defense. The press knows that; I saved your ass and the hospital's. They'd have crucified us if we'd waited longer. And the quarantine includes you! If you so much as step outside to sniff the flowers, I'll have you arrested! You're no longer the boss, you're just another balky patient!"

Carl was more shocked by her rage than her words.

She overrode his attempt at interruption. "And if you're thinking about firing me, forget it! Till the emergency's over, I'm in charge as senior medical staffer—and you *already* have my resignation!"

Gloria went back to her office through the eerily silent halls, fell into her chair and cried. Wasn't it bad enough that she had to battle smallpox? If level-headed Carl Dunbar could react with this blind,

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panicky rejection, what would the public do?

She was barely recovered when the phone rang. Linda told her that Dr. Shephard had called down, saying that it was time for the afternoon's treatment. That was early by their calculations. When she got to his suite she found him wearing the cap and belt leads.

"After all, thanks to the Box, I expect to remain ambulatory till I'm cured—or drop," he said. "You might as well leave the Box here. You're going to be short-handed."

His face was flushed, but Gloria was glad to see that the old papules still looked pretty dry. A couple new ones were forming, though. He was right, it was time for a new treatment. No more than one a day after this, she thought.

"We've been leaving the Box in the outer room, but it stays locked," she said firmly. "But you can put on the leads and take them off."

He peered up at her inquisitively. "When do you start vaccinating staff and re-educating the public?"

Ignoring the latter suggestion, she said gloomily, "I'd start vaccinating today, if I had vaccine. I've called the Center for Disease Control. I doubt there's any in the world. There's not even culture to make it from."

Shephard looked annoyed. "Yes there is—or was. Damn. I didn't realize I was so sick—I hope Nye found a freezer! I started culturing live virus as soon as I realized what was going on. I didn't even know it was smallpox then."

"Where is it—how much do you have?"

"I don't know where—Nye had charge of it—he brought it up on his lap, packed in dry ice. There's not very much—I hardly had any budget by then. Of course culture as such is no use—and it takes two weeks or so to cook vaccine."

Gloria was trembling with relief. "Nye brought your cultures here! Two weeks—and another two weeks for the vaccination to be effective. Still, we have to start. Do you know how to make vaccine?"

Startled, "No."

It wasn't something doctors or nurses needed to know. "Neither do I—I'll call Atlanta."

First Gloria went to the lab, where she found that Shephard's cultures were still frozen and viable. She had the lab begin working on them and called CDC.

"I'm sorry, but we don't know how to make vaccines either," she was told. "All our experts left long ago. I've been thinking about it, though, and I think your best bet is an agricultural pharmaceuticals firm. In farming it's still not cost-effective to use the White Box en masse, especially on animals like chickens that are raised by thousands, so they still use vaccination and some drugs. Kansas City is in the middle of farm country; you must have a number of firms that can help you."

She would never have thought of that. After some swift research she found herself talking to a Paula Murphy, microbiologist for a local firm.

"It's a complicated process," said Murphy dubiously. Gloria took hurried notes of a process that started with viable eggs incubated for 11 to 13 days at 38-39 degrees Celsius. A hole was then punched in the airspace end of the

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shell, phosphate-buffered saline dripped in, and the chorio-allaontic membrane pulled up to create a new air space. Starter culture was dropped in through this and the shell sealed with plastic cement. The egg was then incubated for 48-72 hours at 35 degrees. It sounded dangerous as well as complicated.

"The cultures will look like grapes or sunny-side up eggs but they're gray and white," said the microbiologist. "They'll bulge up above the membrane inside the shell."

"How much vaccine can you get from an egg? And how do you separate it?"

Paula Murphy hesitated. "You'd do better to subcontract it to us."

"What?"

"Look, I'll have to confirm with my bosses, but I can get you all the vaccine you need for free if you'll send us smallpox cultures."

"Why would you do that?"

"It'd give us a month's lead over the competition in production of the vaccine," Murphy said candidly. "Just tell me—is there going to be a market for it?"

"Yes. But look, smallpox is incredibly dangerous—do you really think you can handle it?"

"Know anything about anthrax?"

Gloria knew a little. After a moment some details came to her. Of course it wasn't contagious, merely infectious, but—"Okay. Just remember, those eggs breathe out as well as in, and smallpox can be spread by airborne contagion." She sighed in relief that it would not be necessary to set up such a production line in her hospital.

"How long will this take?" she asked.

"Normally it takes a month. But I'll call our supplier. The hatchery starts eggs daily; we'll get some pre-incubated for two weeks, and we should be turning out vaccine in three or four days."

"Thank God!" said Gloria. They made arrangements for Paula to pick up the cultures.

Harry Jackson entered her office near quitting time. "Carl showed me that article," he said diffidently. "I guess we lost our heads a little. Uh—do you think we can save Dr. Shephard?"

"I have a good hope of it." She eyed him suspiciously. "Why do you ask?"

"I was wondering what Carl should say to the Department of Health."

She hadn't thought about that. The City and State governments naturally had a concern about smallpox. "Have they called?"

"Yes; just for confirmation so far. Apparently there've been a number of people with R.M. calling them to know if they have smallpox. And we've gotten calls from doctors at other hospitals asking if their patients might have it and what they should do."

Another thing she hadn't thought about. "I'll prepare a briefing to be given to any doctor who calls, and to the Department of Health; they can circulate it. Doubtful if anybody has smallpox who wasn't near Shephard—or Nye." That made her frown. "I haven't caught the news. How have they been treating us?"

"With restraint, but the failure of the White Box is a big item for them." He gazed at her solemnly.

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"For all of us," she said bleakly.

"Yes, and people are showing a tendency to panic. —I have two daughters. Well, maybe the Box isn't all we believed it to be, but still it's a powerful agency. I'll keep up hope—for all of us."

Gloria felt better as she watched him leave, looking like a despondent bear. Apparently both he and Carl were thinking again. She decided to quit for the day. Uneasily she realized she needed to catch up on the news. A call to Elaine told her which room was hers; her sister had dropped off clothes at the front door.

She brought them up and unpacked. In the midst of this the TV caught her attention.

". . . reported to the Missouri Division of Health, the Kansas Department of Health and Environment, and the Kansas City, Missouri, Department of Health. None of these agencies has released the text of the Center for Disease Control's announcement, however it is known that the disease is confined to Research Hospital in south Kansas City, and so far only one case has been announced, that of Dr. Shephard."

Gloria dropped a blouse and sat down, dry-mouthed. Of course CDC would make a public announcement! Not that she had tried to suppress the news, but—

"Apparently Research Hospital has not been disturbed, but virtually every other hospital, recharge clinic, and doctor's office in the city has been approached by people who fear they might have smallpox. Patients suffering from recurrent malaise mobbed St. Joseph's and Truman Medical Center, where police were called out to prevent them from entering the City Trauma Center."

The view was of an anxious but quiet and non-violent crowd being blocked off from a door by three patient cops —wearing, ominously, white gauze masks.

"The various state and city departments of health seem to have been caught by surprise by the announcement. Experts admit that smallpox could have lain dormant all these years; few, however, would comment on the apparent failure of the White Box to cure it. Jacqueline Bărron, head of the City Department of Health, could not be reached for comment; her office had nothing to say. The Mayor's office announced that it had every confidence in Ms. Barron and the Department, but declined further comment.

"Can the White Box protect us from disease? Apparently the only ones who know much about the situation are quarantined in Research Hospital—and one of them is fighting for his life."

They ended with a view of Research—blinds drawn, a "Quarantine" sign on the door.

Gloria reached for the phone, wondering how many R.M. sufferers there were in the city. She had the feeling the newsmen weren't telling the half of it, that the city was on the verge of panic. But what could she say that would help? It was premature to announce the imminent production of vaccine. Damn! She needed someone with more authority. If only Carl were rational again—

But, she decided, after the way she had stormed out of his office she had probably better not approach him di-

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rectly. Maybe through Harry. But what to tell him to say?

The announcement of the vaccine had to be the key, she decided. But she knew nothing about that, couldn't make promises. . . . She held her head. Presently coming to a decision, she went to see Dr. Shephard.

A glance at the monitor showed her that he was asleep, though.

"Did you catch the news?" Angie asked, solemn. "R.M. patients starting to panic—"

"Yes, and those shots must've been taken earlier today," Gloria said absently, mostly to herself. "Now that people are getting off work and catching up on the news, we can expect more —and worse."

Police in gauze masks! What's the world coming to? She went toward her office out of habit, hesitated, and passed it, going up the stairs onto the unused upper floors.

What to tell them?

The expensive hospital beds had been sold, but there were still chairs here. Gloria found one, sat gingerly in it, and gazed north over the midcity, a sprawling lower-middle class collection of homes and small businesses.

She'd have to begin by telling the people that the White Box, the great hope of medicine, was ineffective. The realization caused sharp pangs of fear in her own belly . . . how would the public react? Already they were on the verge of panic, and the vaccine wouldn't be available for days.

Without the White Box or vaccine, they were thrown into the Middle Ages . . . quarantine and boil. . . .

Gloria hadn't had much sleep, and it hadn't been restful. Her thoughts slid into dreams, beginning with the televised view of Research's blind windows. From there they veered off into nightmares of the London Plague. She dreamed of Kansas City, in the grip of the plague, then flaming . . . she had set the fires herself, to kill the plague. But it was no use; she had the plague herself, the White Box she wore on her back did not cure it, and everywhere she went, she scattered the red scales of infection. . . .

Waking was a pleasure after that, even with her neck stiff. Shuddering, she stood up and tried to get her joints back in place. It was nearly dark now. Dully she made her way downstairs.

Loud noises greeted her from the lounge. The TV—a war movie? There was no shooting, but a lot of yelling and running. Most of the remaining staff was here. Angie saw her first and cried: "Here she is!"

They pounced on her and dragged her in. "Where've you been?" "Look at this!" "We need your help—" "Carl and Mark were looking for you—"

Gloria stared at the TV, where a mob of people were shaking their fists at a man and a woman on a balcony overhead. Policemen flanked the man and woman, but people kept darting past the guards from the left to shout hysterical questions in their faces. After several seconds Gloria recognized the balcony of City Hall, then the mayor. The woman was presumably the chief of the Department of Health, what was her name . . . Jacky Barron, that was it, she remembered it when the announcer said it. The announcer seemed a little shaken, her voice nervous.

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"Ladies and gentlemen, we are here at City Hall in Kansas City, Missouri, where a crowd of recurrent malaise patients, estimated at over a thousand, have assembled to question the city administration about the White Box, and about its plans for dealing with the spread of smallpox through the city. . . ."

A few shouted words about "being patient" and "vaccine" came from the balcony, but could not be made out.

"These people are badly frightened," said the announcer. Then she was cut off by a commercial.

"That was shot nearly an hour ago," said Elaine, reading from a clipboard. "These are news reports faxed to Mark Nye from the newspaper. According to this, the crowd was dispersed by police, no injuries, but they hung around outside—some are still there, though all officials have left. Not angry—yet; just frightened. Nobody's told them anything."

"Somebody's got to, and fast—and nobody knows anything but us."

"Mark and Carl are working on it," said Angie. "They've been phoning Dr. Shephard, too."

"Where are they?" Gloria asked. "I've got to be there—"

She found them in the Admissions office, grouped around a word processer where Mark struggled with medical terms. Harry's dark face lighted with relief. "Here she is!"

Carl turned quickly and caught her hand in both of his own, but all he said was, "We need your help badly. With the announcement. —People will listen to you—"

Gloria squeezed his hand. "But it's you who should speak to the public, at least open the conference. What's that?"

Mark was juggling a phone and a tape recorder. Harry handed him the mike.

"Shephard on the phone," said Carl.

"This case of smallpox is merely an extreme example of the danger of overreliance on the White Box," Mark said, repeating Shephard's words carefully. "We simply do not know how many diseases are loose among us, masked by the Box and called by the catch-all term of recurrent malaise. There is the grim possibility that people cured of disease with the help of the Box may become carriers. Certainly it begins to seem that vaccination and perhaps even antibiotics will again become a feature of human life. . . ."

"They aren't going to like that," she observed automatically, and then remembered: "We'll have vaccine in three or four days. Dr. Shephard brought up some culture, and a local firm now has it. . . ."

Harry's face brightened enormously; Mark swiveled to glance at her. Carl accepted it with a nod, not realizing the difficulties. Gloria briefed them tersely.

"Thank God," said Harry.

"Maybe we'd better not tell them that it takes two weeks for the vaccine to take effect," she said.

"Accentuate the positive and eliminate the negative?" Mark stopped the tape recorder and explained to Dr. Shephard abut the vaccine.

"Can't eliminate all the negative," said Harry. "The White Box doesn't work on infectious diseases and the public's got to accept the fact. Everyone who has R.M. is at risk and must get

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his disease diagnosed as soon as possible."

"Obviously," said Carl. Perhaps he was thinking of his balance sheet; Gloria almost giggled in light-headed relief.

"Mr. Dunbar?" Elaine looked into the room. "Ms. Barron calling again; she's getting very antsy. The crowds outside City Trauma Center and City Hall are getting bigger and more unruly."

"Tell her we'll have an announcement ready in minutes. Tell her we expect to have vaccine within four or five days. And start calling the TV stations; we'll set it up outside the front door. They'll have to keep their distance."

"Yes sir."

"I've got Dr. Shephard's speech—I mean announcement, ready," said Mark. "Carl, you'd better read it to them —you're impressive and it's heavy stuff. I'd better open—I'm a newsman. Gloria, you should give the technical details. Harry, add a few encouraging words on a positive note."

"You don't really need me there. And I'd rather be blunt with them."

"We need you for moral support," said Gloria crisply. "You'll be there. And go ahead and be the one to tell them what the problem is and what they should do. They'll take it better from a man, I think."

"Bubonic plague, typhoid, rickettsia, and God help us," he growled, but she thought he was not displeased at the thought of appearing on TV.

And now she did laugh, looking at them. "It's going to be a long, hard, grim task, and some may well die before it's over," she said, sobering. "Bringing back vaccine and even antibiotics will be a simple thing beside telling the public its panacea has been taken away. That will not be safe. But educating the public has always been our major—and most difficult—task." Smiling, she said, "I have no doubts we'll ultimately succeed.

"At least," she added, "they won't be mobbing Research Hospital. . . ." ■

IN TIMES TO COME

● Our next issue is the one that always confuses the calendar makers and chronologists: "Mid-December." This year it doesn't have a special theme, as such, but it does have a special line-up of stories, covering a huge range of settings, subject matter, and tone. The cover—Janet Aulisio's first for us—is for George R. R. Martin's "Manna from Heaven," which wraps up the recent series of stories concerning Haviland Tuf's services rendered for the planet S'uthlam. Not, of course, in exactly the way the S'uthlamese anticipated. . . .

The other stories include a delightfully nasty little something for the season, a not-so-delightful but very thought-provoking short by Stephen L. Burns, and an item which S. C. Sykes describes as "sneaks-up-on-you SF" which I suspect will not only sneak up on you but stay with you for quite a while thereafter. Plus novelettes and short stories by Edward A. Byers, Phyllis Eisenstein, P. M. Fergusson, and Laurence Janifer. All that turns out not to leave room for a fact article, but don't worry—they'll be back *next* month.

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Jay Kay Klein's biolog

"It was the craziest thing I ever heard of," Willy Ley told me about Hitler's plans. As a founder of the German Rocket Society, Willy was ordered in 1935 to join military rocket development. He packed a single bag, left all his personal possessions in Berlin to allay suspicion, and went on what he said was a two-week vacation to London. He stayed briefly and left for the United States. While Wernher von Braun aimed for the stars but hit London, Willy aimed for the United States and hit *Astounding* (as *Analog* was known then).

The German rocket experimenters were mostly science fiction readers, and Willy had already begun to make his living by writing. His first appearance in this magazine was as Robert Willey, with a cover story novel *At the Perihelion* in February, 1937, was about an American educated in German rocket science who had to cope with a Soviet-dominated Mars.

Although two more "Willey" stories were to appear, it was as a science writer that Willy hit his stride in the very next issue with "The Dawn of the Conquest of Space." He had started in this magazine about the same time as its new editor John Campbell and had an article "Geography for Time Travellers" in the famous July, 1939 issue said to mark the beginning of the "Golden Age of Science Fiction." This was a "seque!" to an earlier article "Language for Time Travellers" by L. Sprague de Camp.

Willy had specialized in zoology and paleontology at the universities of Berlin and Koenigsberg, with courses in astronomy and physics, expecting to become a geologist. Many of his books dealt with the offbeat in biology, such as *The Lungfish, the Dodo, and the Unicorn* and *Willy Ley's Exotic Zoology*. Coming across a book in 1925 by Hermann Oberth, he became so interested in rocketry that his greatest fame lies in that area. His famous *Rockets* was published in 1944, revised into *Rockets and Space Travel* in 1947, and later in various editions as *Rockets, Missiles, and Space Travel* until his death in 1969. He became the only contributor to this magazine that I know of to have his name attached to a major crater on the Moon. A Doctor of Humane Letters came in 1959 from Adelphi College.

Willy remained a science fiction fan, attending conventions where he was a popular speaker on interplanetary travel. He spoke at the first world convention in 1939, and won a Hugo in 1953 for Excellence in Fact Articles. Another followed in 1956 for Best Feature Writer.

His books and articles are fascinating reading to this day, due I'm sure to his interest in a universe of wonders tempered by an endless personal supply of good humor. Isaac Asimov first met Willy in 1940 in this magazine's offices, noting "something lovable about him—a kind of intense but unpretentious rationality." Willy Ley died on June 24, 1969—just a few weeks before the first Lunar landing. ■

Willy Ley

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The Alternate View

ANTIMATTER IN A TRAP

John G. Cramer

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"What," the Alchemist asked his new apprentice, "is the Universal Solvent?"

"Master," said the lad, "it's one of the fundamental substances of Alchemy. It will dissolve any solid material. A drop will dissolve the hardest steel, the finest glass, the most inert wax."

"Very well," said the old man with a frown. "I am about to make some. Your assignment is to prepare a bottle in which to put it . . ."

This AV Column is about the Universal Solvent of modern physics which we call antimatter, and about a bottle in which it can be and has been kept. However, before getting to the hardware I want to talk about antimatter as it relates to the fundamental symmetries of the universe.

Physicists have, over the years, been able to get a lot of mileage out of a single nifty idea: *Nature is Symmetric.* Pioneers like Galileo, Newton, Maxwell, Einstein, Fermi, and many recent Nobel laureats have based their work on the notion that nature at the core is basically symmetrical and evenhanded. For example, space has the same properties in all directions. The laws of physics must be the same in all inertial (constant-speed) reference frames. An object with certain symmetries produces effects with the same symmetries. The laws of physics must be the same here and now as they were long ago in a galaxy far away. And so on.

And yet as more and more is learned about the inner workings of the universe we have discovered that the *breaking* of these fundamental symmetries of the universe is also important. The major physics breakthrough of the late 1950s was the revelation that the space symmetry called "parity" (that nature looks the same in mirror-image) is thoroughly broken, spindled, and mutilated by the "weak" force acting in radioactive transformation processes like beta decay. In the mid 1960s it was discovered that the weak decay of the "strange" K_L° meson showed a "CP-violation" (the rough equivalent of broken time symmetry). And the recent development of what theoretical physicists modestly call Grand Unified Theories (GUTs) is based on the symmetry breaking of three of the fundamental forces (strong, weak, and electromagnetic). This splitting of one "unified" force into three very different forces happened "spontaneously" as the universe cooled off in expanding after the Big Bang (see "Other Universes 1," *Analog*, September, 1984) The symmetries of nature seem made for the breaking.

Some broken symmetries are important for our well-being. Our everyday life depends on two overwhelmingly important breakings of symmetry at the macroscopic level: (1) our world is clearly different with time running forward than it would be with time running backward, and (2) there is more matter

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than antimatter in our local environment. Some SF writers (Brian Aldiss in *Cryptozoic!*, for example) have been able to contemplate a somewhat time-symmetric world. But no one, to my knowledge, has written about everyday life in a "C-symmetric" world in which the local environment was an equal mix of matter and antimatter. Such a literary undertaking would surely be a *short* story because the incipient matter-antimatter annihilation would blow everything to photons and neutrinos in nanoseconds.

And so we have a paradox. The microscopic world is so symmetric that only with the greatest of difficulty have we been able to find one obscure physical process, the K_L° decay, which shows any preference at all for one direction of time over another or for matter over antimatter. And yet in the macroscopic everyday world these time and matter preferences are everywhere, and we depend on them in our everyday lives. The matter/antimatter unbalance is not just a local phenomenon. There is now fairly good observational evidence that there are no large amounts of antimatter even in more remote parts of the universe in the form of anti-stars and anti-galaxies. And so we must ask: "How can the macrocosm be so radically different from the microcosm when it is really only a summation of all of the microscopic fundamental processes, as viewed from a distance in space and time?"

The preference of the everyday world for the forward time direction, the "Arrow of Time" problem, was discussed in one of my recent AV columns ("Light in Reverse Gear II," *Analog*, August, 1985) and that discussion will do for now. In this AV column I want to consider the questions: **"Where did all of this matter come from, and where did all of the antimatter go?"** The GUTs theorists believe that they have the answer to this question. Their scenario is that in the primordial soup of the very early universe there were other heavier particles which, like the K_L° meson, had a "CP violation," a slight preference for decaying into matter particles instead of antimatter particles. The net result of this is that the early universe had about 100,000,001 protons for every 100,000,000 antiprotons. In the cooling after the Big Bang the protons and antiprotons found and destroyed each other until the slight excess of protons became all the matter there was (and is). A side-effect of the same CP-violating processes is that there is also an excess of electrons over positrons. The surviving protons and electrons, about 100,000 years after the Big Bang, paired off to form hydrogen atoms which eventually went into business as stars and galaxies. The enormous energies from matter-antimatter annihilations of the early universe cooled with expansion down to 3° K, the present average temperature of the universe. The electrons and protons around us (and in us) are the few ragged survivors of the "antimatter wars" of 16 billion years ago.

We would like to understand in a more fundamental way why matter was preferred over antimatter in the early universe. The preference shown by the K_L° meson (a matter-antimatter pairing of a "strange" quark and a "down" quark) is a tantalizing hint at the mat-

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ter/antimatter difference, but we would like to know whether there are other ways in which antimatter differs from matter. One way of looking for such differences is to compare all the measurable properties of matter particles (protons and electrons) with the same properties of antimatter particles (antiprotons and positrons). This comes down to the experimental problem of how we can weigh and measure particles of antimatter.

The first problem that we encounter here is that there aren't any antimatter particles lying around to be used in measurements. They were all destroyed shortly after the Big Bang. But we are not out of business, because we can **make** antimatter. We can make antiprotons with large particle accelerators. At the LEAR (Low Energy Antiproton Ring) facility at CERN laboratory in Switzerland, physicists have been able to produce huge numbers of antiprotons, store them for hours as they coast in circular orbits through a ring of magnets, and finally deliver them as a beam of particles for nuclear reaction studies. Positrons are even easier. Nuclear reactors make certain isotopes which emit positrons during radioactive decay, and positrons can also be produced by beams of electrons and preserved by orbiting in a ring of magnets.

In storage rings measurement of the properties of antimatter particles is usually not very precise because the very factors that keep the particles stable in orbit also interfere with measurement precision. Therefore, one would like to be able to measure the particles "at rest" in the laboratory. This is related to the alchemist's problem of storing the

Illustration by William R. Warren, Jr., 1985

Universal Solvent. Since antimatter will annihilate on contact with any matter, what kind of bottle can hold it?

Fortunately this problem has an experimental solution. A group of physicists at the University of Washington has developed a bottle for antimatter called a Penning Trap. It looks rather like a metal hour-glass with a knob poking into each end. The knobs and hour-glass are given opposite electrical charges, and the whole thing is placed in a magnetic field pointing along the axis of the hour glass. Into this apparatus one can place a single proton or electron, and the particle will stay there, held in place by the electric and magnetic forces of the trap. One can then "play games" with the trapped particle, putting it through a routine of shaking and bouncing and oscillation that determines its mass, charge, spin, and internal magnetic field to almost unimaginable precision.

A few years ago a single particle of antimatter, a positron, was successfully captured in such a trap. Positrons from a radioactive source were slowed and carefully manipulated until one popped

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into the Penning Trap. There it was weighed and measured to see whether it showed any differences (other than charge) from its equivalent matter particle, the electron. The same positron stayed in the trap for a number of days. It represents the first instance of artificially produced antimatter at rest on Earth lasting for more than a fraction of a second. The measurements made on the single trapped positron are capable of detecting differences of one part in a trillion (10^{-12}), but even with this remarkable accuracy no difference between electrons and positrons was detected.

A similar experiment is now being prepared for trapping an antiproton. The trap apparatus will be taken to the LEAR facility at CERN. There an antiproton will be carefully slowed and captured in the trap. The experimenters expect that a proton-antiproton mass difference smaller than one part in a billion (10^{-9}) could be detected. If such a difference existed, it would be a very significant clue toward solving the mystery of the matter/antimatter imbalance of the universe.

But beyond the weights-and-measures of antimatter, the experiment will represent a demonstration that antimatter can be produced, captured, and stored at rest for indefinite periods in the laboratory. As Robert L. Forward has pointed out in the pages of *Analog*, antimatter is the most compact way yet devised for storing energy, and it may have enormous potential as a fuel for starship engines. We have the Universal Solvent and we have the bottle in which to keep it. The rest is a problem for engineers and alchemists. ■

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THOMAS L. SHERRED, 1915-1985

T. L. Sherred only published one story in *Astounding*: the novella "E for Effort," which first appeared here in 1947 and has been anthologized many times since—but its impact was such that he would be remembered for that story even if he had never written anything else. He did write other stories, including the novel *Alien Island*, but never as much as his readers might have wished. He suffered a stroke in 1971; he didn't write much afterward, but he remained very much a part of the Michigan science fiction community. He died April 16 in Detroit while undergoing bypass surgery, following a heart attack the previous week. His final novel, a sequel to *Alien Island*, has been completed by Lloyd Biggle, Jr., and should be out from Doubleday by the time you read this.

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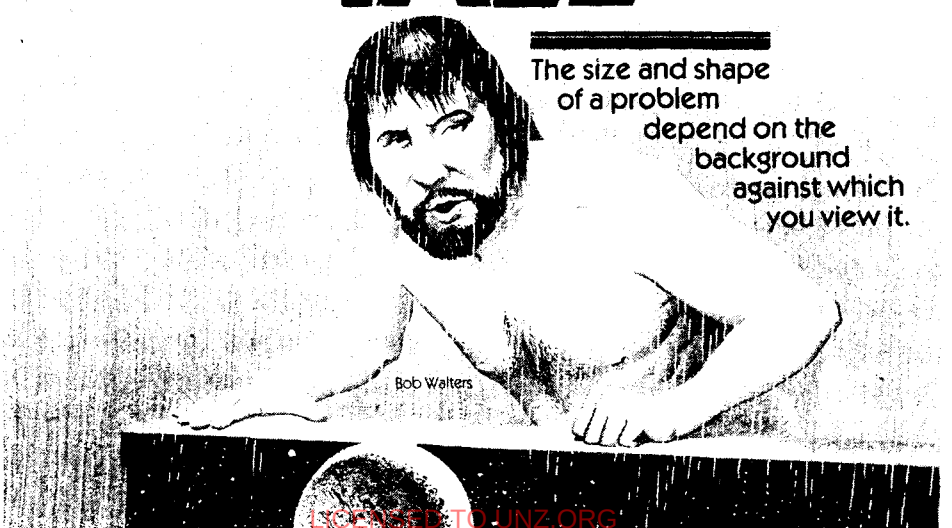
Spider Robinson

THE BLACKSMITH'S TALE



Once I bought a watch whose battery was rated for one year. The next time I gave it a thought was when it failed—four years later. Something familiar cannot be odd, until it stops.

Similarly, there is no set opening time at Callahan's Place. Once I came by at three in the afternoon, to talk to Callahan about something, and found that the Place had been open for over an hour; another time I arrived at seven P.M. and Mike was just opening the door. But somehow, for the better part of a decade, it never struck me that the Place was always open when I arrived —until the night it wasn't.

Nearly nine o'clock of a warm wet summer evening, and the door was shut tight. Only dim light came through the windows, nothing like the warm cheery glow the Place has when it's open, and the only thing in the parking lot besides my own car was a big beat-up van I didn't recognize.

The rain complicated things. I don't mind rain a lot, and I *like* it when it's

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warm—as it was that night—but it had been coming down hard for the last fifteen minutes, and so the note posted on the door was only partly legible. I could translate **"empor rily losed f r enovat ons,"** and **"doo pens at,"** but the *time* at which the doo' would 'pen was three blurs, all rounded at the top. Perhaps "9:00," perhaps "9:20" or "9:30." Or perhaps it read "8:30," and the job, whatever it was, was running overtime. Worst, there was a big long blur *after* the time. It might have said "9:00 sharp," but it could just as easily have been "3:00 Friday."

When that watch battery I mentioned earlier finally failed, I buried it in my backyard, respectful of its magnificent achievement. But that was after reflection. My *immediate* reaction was acute annoyance. I thought my watch had failed me.

So it was now. I could think of several ways to go kill some time—but how much time? Meanwhile I was getting soaked. So I did what I don't think I

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would have done under other circumstances.

I opened the door and walked in.

I knew it wouldn't be locked, because there is no lock on that door. In the dozen years I've been coming to Callahan's, there've been four attempted afterhours burglaries that I know of. None of them used the front door; none bothered to try. (Callahan dealt with them situationally. One is now a regular customer, and never mind which one; another, a hard-guy type, got two broken elbows.)

But I should have knocked first, and waited for Mike to open the door or holler "Come in," and gone away if he didn't.

Which he wouldn't have—there was no sign of him when I had closed the door behind me. But I failed to notice; once I'd wiped my glasses dry, I was too busy being thunderstruck.

Do you remember that time I told you about once, when I walked into Callahan's to find a mirror behind the bar, where no mirror had ever been before? And it disoriented me so much that I mistook my reflection for an approaching demon, with "horns" that were really the brim of my Stetson hat? This was like that. Something as familiar as Callahan's Place is not supposed to change. The watch battery is supposed to last forever. I may have actually twitched and squeaked, I don't know.

The light was as bad as it had been that other time, with the mirror, and so once again my brain, trying to resolve unexpected data into a pattern, made a first approximation that vaguely matched something in its files and served me up a trial hallucination. For a predator such as man, a wrong guess can be preferable to a slow one.

What I thought I saw, off to my left, a few yards away, was a *giant* ebony snake, maybe three feet in diameter, coiled around a tree, scales shimmering in the semidarkness. Tree and snake appeared to extend up through the ceiling without rupturing it.

I blinked and it wasn't a snake, it was an immense DNA double helix clinging to a barber pole, pulsing dully with life. So I blinked again.

(First the predator brain searches the file of Dangerous Things. If that doesn't work it tries Nondangerous Living Things. Only then does it calm down and search all the other files. Two seconds, tops.)

It was a spiral staircase up to the roof.

"*Cushla machree,*" I said softly.

What had made it seem to be a *double* helix was the heavy railing which paralleled the stairs. The "scales" were the spaces between the railing supports. The apparent shimmering and/or pulsing was because one of the very few lights in the room, a small flourescent behind the bar, was flickering rapidly.

I said (prophetically enough) that I would be dipped in shit, but I relaxed. I was beginning to understand.

Mike Callahan lets his customers take their drinks up on the roof if the weather's agreeable. There's a dumbwaiter to ferry cash down and drinks up. But until now the only access for humans and most other customers had been a vertical ladder and hatch. Some of the regulars had trouble getting up the ladder due to age or infirmity. Certain others could get *up* just fine—but found that the added ballast of four or

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five drinks seriously disrupted their balance on the way *down*. Something about the center of gravity shifting, Doc Webster said. Just a few days before, Shorty Steinitz had broken an ankle—and here was Callahan's response.

"Hey, Mike," I called out, and got no answer. The curtain behind the bar was closed. I had gall enough to enter Callahan's bar uninvited, but not his living space. I called his name once more and wandered over to inspect the new staircase.

It was a cast iron joy to behold. I'm totally ignorant about such things, but I could tell that it was *old*, and *beautiful*, and very well designed. You could not fall down that staircase. You couldn't even bark your shin. It was so well installed that it looked like it'd been there for years—except for the odd bits of welding spatter in the sawdust on the floor—and indeed it fit right in with the atmosphere of Callahan's Place. Ornamented rather than starkly functional, subtly and ingeniously worked in ways I was not competent to appreciate even if the light had been adequate, it would not have looked out of place in a cellar jazz joint or a monastery, might have done time in both. It invited one to climb it.

So I did.

The footing was secure, the risers precisely the right height, the treads precisely the right depth. It had to be a modular assembly. A single giant staircase, even if it had happened to fit through the front door, would have required trucks, cranes, dollies, rollers, block and tackle and much time —whereas an assembly job this size could conceivably have been installed

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in a single day by two or three big skilled men. But it was so *cunningly* assembled that it was hard to be sure. This had to have cost Callahan a bundle.

I wound my way around and up until I stood in a sort of hut with a door opening onto the roof. I thought about rainwater spilling down into the bar below, but when I experimentally opened the door a crack there was no flood. I pushed it open and the everpresent sound of rain went from bass rumble to treble hiss. It seemed to be easing up.

The rain did not spill indoors because the floor of the hut was slightly higher than the roof. But you did not have to remember to step down; there was a short ramp. I know little more about carpentry than I do about iron work—but I know good design when I fail to trip over it. It figured that Mike Callahan would hire the best man available to do surgery on his Place.

The door closed quickly; some unseen damping mechanism kept it from slamming, in the rain it made no sound at all. I walked around the hut once, admiring it . . . then walked around it again, admiring the countryside.

I'm sure you know the strange, special magic of high places. Have you ever been on one at night? In the warm rain?

To be sure, Callahan's roof is a wonderful place from which to view the world in nearly any weather. The land falls sharply away to the north and east, and incredibly for Long Island (even for Suffolk County) it is largely undeveloped, raw trees as far as you can make out. To the south and west, beyond the parking lot, runs Route 25A, sparsely lined with garishly lit sucker traps. (Fairly heavy traffic, but Callahan doesn't get a lot of transient trade. The parking lot is hidden by tall hedges, the driveway is inconspicuous; the only sign is the one over the front door.) Beyond the highway you can just make out one of the more expensive subdivisions, well zoned, landscaped and cared for; on Christmas Eve, with a couple of Irish coffees warming your belly and all the lights blazing in the distance, it looks . . . well, Christmasy.

Tonight the roof was a warm flat rock on which many large somethings were peeing, from a great height. The highway looked glorious—but my clothes were getting wet. Wetter. I considered ducking back inside . . . but as I said, I *like* warm rain. I particularly like to be naked in warm rain, and don't get a lot of opportunities. Mike wouldn't mind, and anyone else I would see drive up.

So I stripped and looked about for the driest place to stash my clothes.

The dumbwaiter seemed like the best bet; I could wedge its door open with something to keep it up here at roof level. I padded barefoot toward its tall housing—and discovered that it was already so wedged, with a chisel. Inside was a pile of clothing. Big man's clothes, faded jeans, denim shirt, boots, sized to fit only one man I knew. That solved the mystery of Callahan's whereabouts. He must be a secret naked-in-the-rain nut too. He was going to jump a foot in the air when I came around the dumbwaiter. This would be good for laughs—and it might cost him a couple of drinks to keep the story to myself . . .

It was just possible that my fellow nudist was not Callahan—in which case I was properly dressed to meet him.

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Onward.

I should have *lifted up* the jeans. The underwear might have warned me. I piled my clothes on top of the others, walked around the dumbwaiter, and became one myself. Waiting, dumb, one foot in the air. She was very beautiful, and in the instant I saw her I wanted urgently to *do this right,* to not make any mistakes. It was not going to be easy.

I am sorry to say that you would probably not have thought she was beautiful —unless you too are a pervert. I mean, going naked in the rain is one thing, but I'm talking major league perversion here. (From my point of view I am the only sane man in a perverted culture. Perverts always feel that way.)

I will state the perversion: I like women who look like women. That is, my ideal of feminine beauty adheres closely to that which has been the generally accepted consensus from the dawn of time until quite recently and quite locally.

What you would probably have said if you'd seen her, naked or clothed, is, "Handsome woman; she could be beautiful if she lost the weight." You would probably have gallantly tried to avoid looking at, let alone commenting on, her body—you almost certainly would not have drunk the sight of it in the way I did.

She did not, in other words, look the way North America thinks women should look. She did not look like a thirteen year old boy with plums in his shirt pockets. Those were her clothes in the dumbwaiter. And I do not even mean that she was a Jayne Mansfield/Loni Anderson type, with one of those big bodies that seems packed tight, compressed snugly by invisible plastic, firm as a weightlifter's shoulder. She had big glorious saggy tits, and what are sometimes affectionately called "love handles," (that is, the people who use the term sometimes mean it affectionately) and a round belly and thighs that would jiggle when she walked.

She looked, in short, much like half the mature women in this sorry culture, and she would have opened the nose of most of the heterosexual males who ever lived. Praxiteles, Titian, Rubens, Rodin, any of the great ones would have reached for their tools, if not their work utensils, at the sight of her.

You know: a whale. A hippo. I'm telling ya, Morty, this broad was a hunnert'eighty, hun'ninety pounds if she was a friggin' ounce, no shit. One of America's millions of rejects, forever barred from The Good Life, too sunk in sloth or genetic degeneracy to torture herself into the semblance of an undernourished adolescent male. A pig. No character, no will power, no self discipline, no self respect, certainly no sex appeal. A lifelong figure of fun, doomed to be jolly, member of the only minority group that "comedians" like Joan Rivers can still get away with viciously assaulting.

I could tell I was beginning to get an erection.

So I used the second I had left to study her face. A socially difficult moment was imminent, and I wanted it to go well, so I needed to know as much about her as possible, immediately.

Big lush women and small slight men

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in our society go through life wrapped around a softball-sized chunk of pain; it breaks some of them and makes others magnificent. She was magnificent. Clearly visible on her face, written plain for any fool to see, were the character, will power, self discipline, self respect and warm sexiness which common wisdom said she could not possibly have without automatically becoming skinny. She had lots of laugher's wrinkles and a couple of thinker's wrinkles and no other kinds. She wore her hair in a big bush of curls that made no futile attempt to downplay her size; rain-sparkle made it a halo. The split-second glance I got of her eyes, glistening in the light from the all-night deli across the road, focused on the far distance, made them seem serene, self-confident.

I went on computer time. And a very good computer it must have been, too, because I was able to run several very complex subprograms in the second or so allotted to me. One routine sorted through the several hundred thousand Opening Lines in storage for something suitable to Unexpected Encounter With Nude Stranger, but since it expected to come up empty, a more ambitious program attempted to create something new, something witty and engaging and reassuring, out of the materials of the situation. In hopes that one or the other would succeed, a simple and well-used program began selecting the tone and pitch of voice and manner of delivery —soft enough not to startle, but not so soft as to seem wimpy; humorous but not clownish; urbane but not smug; admiring but not lecherous—prepared, in short, to begin lying through its/my teeth. Meanwhile an almost unconscious algorithm had me keep my hands firmly at my sides and stand up a little straighter. And all of this together took up, at most, twenty percent of the available bytes—the rest was fully occupied in an urgent priority task.

Memorizing her . . .

Plenty of time! Computational capacity to spare! I knew that she was beginning to become aware of me several hundred nanoseconds before she did, integrated all the subprograms, picked a neutral Opening Line and pinned my hopes on delivery, ran a hundred full dress rehearsals to derive best- and worst-case results, made the go decision, and had time to admire her lower left eyelash and myself before I heard my very own voice say, with all the warmth and tone and clarity I could reasonably have hoped for, "It certainly is a very nice tits."

My central processing unit melted down into slag.

It took her ten years to turn and look at me, and no thought of any kind took place inside my skull: horror fused every circuit. She looked me square in the eye, absolutely expressionlessly, for endless decades, while I marinated in failure and shame. Then her gaze left my eyes, panned slowly downward. It rested on my mouth for many years, moved on down again, did not pause until it

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reached my feet, then came back up again and paused where it was bound to eventually—but I was centuries dead by then, only a cinder of consciousness remained in my brain to be snuffed by the realization that my erection was now up to at least half mast, and so by the time her gaze got back up to my eyes, I don't see how she could possibly have seen glowing therefrom the slightest light of intelligence.

The animal who sleeps under my computer woke up and tried its best. It tried for a smile, doubtless produced a horrible grimace. It essayed a merry laugh, managed to generate a hideous gargling sound. It gestured vaguely, attempting a Gallic shrug and failing to bring it off. To all of this she displayed no visible reaction whatever. The old animal gave up.

The first plan I formed was to jump off the roof, but the problem with that was that it could only be done once and might not hurt enough long enough, so I stepped closer to the dumbwaiter housing and began battering my head against it to soften my skull up for the grand finale, and I liked the way it felt and began to get a rhythm going, and then and only then did she burst out into a magnificent bellow of laughter, a great trombone hoot of shocked merriment, and big as she was she was up out of tailor's seat and holding me away from the dumbwaiter before I could deliver it another blow, and then there was a great complicated rocking struggling hugging stumbling confusion of laughter and tears and rain that somehow left us sitting on our asses on that wet roof with our feet touching, both of us shuddering with mirth. We nearly got our breath back a few minutes later, but when she tried to speak all she got out was "smooth" before dissolving into hysterics again, and a little after that I managed to get out, "My Freudian slip is—" before I lost it, and when the earthquake had well and truly passed I was lying flat on my back with rain running up my nostrils and the soles of my feet pressed firmly against human warmth. My hands hurt a little from beating them on the roof.

I sat up.

So did she. I must have looked forlorn. My erection was gone. "It's okay," she said, pressing her toes gently against mine. "I've heard worse."

"You don't understand," I moaned.

"Admittedly—but I think I got the message."

"But—"

"It was, unquestionably, the most memorable meeting of my life, and nothing will ever top it." Oh, if only she'd been right.

I was beginning slowly to realize that this situation was salvageable—that the disaster was of such epic proportion as to be a kind of triumph. I had certainly made an impression on her. Was this not Callahan's Place—albeit empty—beneath my butt? Callahan's Place, focus of strange and wonderful events, magical tavern in which nothing was impossible and few things even unlikely? Could there be any better, more fitting place for a miracle to happen than here on Callahan's roof?

But exactly where to go from here was hidden from me. "I'm Jake."

"I'm glad. I thought you might have really hurt yourself there."

"I meant that my name is Jake."

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"Glad to hear it. What *is* your name?"

Better and better. I like them quick. "Damned if I know. What's yours? And *please* don't say, 'Thanks, I'll have a beer.' "

"I'm Mary, Jake."

With what feeble wits I had left, I attempted a cunning investigation. "You must know the guys who put in that splendid staircase, right?"

She went two degrees cooler. "I put in the staircase."

"Excuse me," I said faintly, and got to my feet. The dumbwaiter housing felt just as good as it had before; there was just enough give to it to cause an energetic rebound, but not so much as to soften the impact.

Unexpectedly my ears hurt, and the rhythm of my head was halted. "*Stop that,*" she said, twisting me by both ears to face her. "Damn it, I had no business getting chilly at you that way. I must be the first lady blacksmith you've ever run into, how the hell could you know? You did good: you didn't look disbelieving, just surprised."

I shook my head. It stayed on. "You're the *second* woman smith I've met. That's why I'm mad at myself—I should have guessed."

She stepped back a pace and put her hands on her hips. "Jake," she said softly, "you're trying too hard."

"I know. Is it flattering at least?"

Her laugh was a good hearty bray. "Yes, by damn. And not entirely ineffective: I can't wait to find out what you're like when you're normal."

I felt my breathing begin to slow and my shoulders begin to relax. "I've always wondered myself. But at my worst I should have known that you put in that staircase."

"Why?"

"Because you *look* like the person who did it. Everything it takes to do a job that good, you've got, I could see that before you knew I was here, so I should have figured it out."

She dimpled. "There, you see? You finally got a compliment out straight — you're getting better."

"Where did it come from?"

"It spent its early years in the library of a wealthy bishop. For the last thirty years it was in the best whorehouse in Brooklyn, but the place closed down a few months back—"

I was stricken. "Lady Sally's is *closed?*"

She nodded sadly. "Too much cutrate competition. Changing fashions. Nowadays they all seem to want sleaze, and a place like Sally's is out of style."

"My God! I *know* that staircase! Do you mean to tell me that *Lady Sally McGee's staircase is here in Callahan's bar?*" I began to smile through my sorrow. "Ah, God, Sally," I said to the weeping heavens, "I'm sorry they closed you down, the world is a darker place —but at least all your treasures haven't fallen among heathens. Mary, where is the grand old lady, do you know?"

"Enjoying her retirement. This is a good home for the staircase, then?"

"Only the very best. This is *Callahan's Place*, do you see? No, how could you see?"

"The way you could see that I was a good smith, maybe. There *is* something about the place. But I—"

"Be sure. If the staircase had legs, it would have walked here. Miracles

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happen here—a little like the ones that happened at Lady Sally's, come to think. Is Mike planning to open tonight, do you know?''

''About half an hour from now, he said.''

''Then you'll see. You'll like the gang—they're the best family I ever had. Did Mike tell you about the house rules?''

''House rules?''

''Every drink in the house costs half a buck. Mike accepts nothing but singles. On your way out you collect whatever change you have coming from the cigar-box full of quarters on the end of the bar—unless you've been visiting the fireplace—''

''Hold it. The drinks are half a buck?''

''Yeah, why?''

''These days a *beer* in most bars costs more than a dollar.''

''Really? I don't go to any other bars.''

''And nobody rips off the quarters? He must watch the box like a hawk—''

''Nope. Nobody watches the box. That's some of what I mean about Callahan's Place.''

She shook her head gently. ''Go on. Something about 'visiting the fireplace' —''

''If you feel the urge to, or the need to, you step up to the chalk line and face the fireplace. You have to make a toast aloud, and everyone shuts up while you do. Then you deep-six your glass, into the fireplace. It costs you your change for that drink, but it can really take a load off your shoulders sometimes.''

''My,'' she said softly.

''People tend to come here when they're in need of help, not always but pretty often. They get it, most times. We help each other. These days, it's getting hard to find a bar where the bartender'll even pretend to listen to your troubles any more. At Callahan's Place *everybody* will listen to your problems. Respectfully. Carefully. You can't imagine the stories that get told here, sometimes.''

''Sounds like a depressing place to get drunk.''

I grinned. ''You'll see. Everyone else must have come by earlier and seen that sign down on the front door before it got rained on; they'll be here soon. A merry crew, one and all. I give you fair warning: we are all paronomasiacs.''

Her eyes widened in horror. ''God, no! Not *punsters!*''

''But it's all right—tonight isn't Punday.''

''Punday.''

''The night on which the worst punster gets his or her tab refunded.''

She staggered. ''Christ, that was close. Too close.''

''No, tonight is Tall Tales Night—and I'll tell you, it takes a lot to qualify as a tall tale in Callahan's. We've had a real talking dog, for instance. And a whole slew of time travelers. Two aliens . . . say, there's one of them now.'' I waved. *''Hi, Finn!''*

She turned and saw him, and stood very still.

Well, how *could* I have prepared her? Callahan's Place is like that, you have to sink or swim. It was her turn.

Mickey Finn had been decelerating sharply when I first caught sight of him; he came in the last hundred yards like a seagull and landed with much more

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grace. Rain declined to fall on him—one reason I'd spotted him in the darkness—and when he was standing beside us the rain ignored us too. "Hello, Jake my friend." He politely began to undress.

"Not necessary, Mickey. Real good to see you, man—it's been too long! Allow me to present Mary. Mary, this is my friend Mickey Finn."

Mary was transfixed. That surprised me. This woman had not been visibly fazed by encountering a naked stranger of the opposite sex, while herself naked, in a remote place; I had expected her to take Finn more or less in stride. I will admit that, considered dispassionately, a naked man *is* less startling than a flying man, particularly a flying man who stands six-eleven-and-a-half, has a magnificent craggy face and eyes like oxyacetylene blowtorches, and repels moisture. But *I* was the naked man in question. I found myself mildly irritated.

Still, if Mary was having difficulty rising to this social challenge, the gallant thing to do was to help. Finn was visibly wondering if he should offer his hand, so I offered him mine. After a genuinely warm handshake—I like the big cyborg—I gently tugged his hand in the direction of the new stairwell. "Mary put in the staircase over there. You ought to check it out, it's *special*." I winked with the eye Mary couldn't see. "Why don't you see if you can find Callahan while you're down there, see about getting this joint opened up for the night?"

Finn surprised me too, a little—by taking his cue smoothly and without hesitation. He gets more sophisticated in human ways (excuse me, in Terran ways) every time I see him. "Certainly, Jake. We'll talk when you come down. It was very nice meeting you, Mary." He left quickly on those long legs, and even after the stairwell door had closed behind him, the rain kept failing to land on us. I would have loved to spend an hour trying to figure out how Finn did that—before asking him—but I was busy.

Mary was still standing exactly as she had been when Finn first landed, pivoted slightly to her left, looking even further left, smack through the spot where Finn had been. She hadn't moved a muscle.

I cleared my throat.

"Aliens, okay," she said in a clear, calm voice, still not moving, "but I don't believe you've had a talking dog."

I took it as a sign of recovery. "We didn't either, at first. Fella came in trying to cadge drinks with the old talking dog routine. Of course, we figured it was a ventriloquism scam—and so it was. The guy was a mute, and the dog was a mutant—*he was the ventriloquist*. They partnered up because they were lonely—nobody would talk to either of them, alone. They hang out here a lot, now."

She straightened from her pivot, worked her shoulders slightly, then relaxed. "He certainly is."

"Who certainly is what?"

"He certainly is a Mickey Finn."

She still wasn't entirely back in the world. But the part that was, was out of this world. Now that she was rainproof, droplets hung all over her body like facets on a precious stone, some

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standing still, some, like my gaze, trying to migrate downward. I wrestled my gaze up as high as I could manage, and thought of something that might reach her. "Those certainly are a very nice night."

It worked. It took her a second to get it, and then she laughed, about Force Six. "Jake," she said, "you've got a nice looking evening yourself. I think I'm going to like this bar. Do you suppose this no-rain gimmick would work on our clothes if we took them out and put them on? Or is it necessary to dress before going downstairs?"

"Not necessary, no, but clothes *are* customarily worn. But don't ask me how Finn's technology works—the only way to find out is to try."

Sure enough, the rain avoided our clothing too. "Of course," I said, "they'll get wet when we put them—" and then stopped. I wasn't wet any more. Neither was she. Our *hair* was dry, and I hadn't felt a breeze. My own clothes, which had been damp when I left them, were dry, and stayed that way.

"Fascinating," she murmured, for all the world like Mr. Spock.

I nodded. "Finn's great to have around in winter." I tossed her clothes to her, and she caught the stack. I began dressing myself. Do you think it silly that after having spent considerable time naked together, we averted our eyes as we dressed? I'm sure we both thought so—but we did it.

I liked her just as well, dressed. That is to say: dressed, she made me want to see her undressed again, as soon as possible. I wished the light were better. I could faintly hear sounds from below us, distant thuds and voices, one of them unmistakably Callahan's. Doc Webster's Studebaker pulled into the parking lot, followed by Long-Drink McGonnigle's truck, and way off down 25A I could hear Fast Eddie's Hideousmobile approaching. Callahan's Place was getting ready for a late opening.

She gestured vaguely at the weepy heavens above (and I couldn't help wondering how the raindrops knew enough not to fall in the path of her moving arm) and said, "Finn's from . . . well, out there, isn't he?"

"Yep. *Way* out."

"How long has he been here?"

"A little over ten years now, I make it."

"And he's spent the whole time hanging out in bars? What the hell was his mission?"

"The extermination of human life."

"*Dammit, Jake, that's not funny.*"

"Don't panic—he defected. A long time ago, a couple of days after he arrived. His first night at Callahan's Place."

She visibly relaxed, but her face had a funny expression. "I see. Say no more, by all means. I think you've certainly covered all the high points of the story."

So I told her all about Finn, about the night he came to Callahan's and acquired his name—*just* in the nick of time.* I told her about the night he took on Adolph Hitler out in the parking lot, and how big the resulting crater was, until he fixed it. I told her about his successive careers as a farmer, a fisherman, a forest fire-watcher and a lighthouse keeper, and by then I got the idea that I was talking entirely too much

*see "The Guy With The Eyes," CALLAHAN'S CROSSTIME SALOON (Berkley) [*Analog* February 1973]

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about Finn and decided to try for a smooth segué to some more rewarding topic.

"But enough about Finn. Let's talk about me. I am, in no particular order, a singer, a songwriter, a guitar player, a nice person, and in no particular order. I play here some nights with Fast Eddie the piano player, and we're very good. I have many of my original teeth and no ex-wives or children living and I find you the most devastatingly attractive woman I've met in at least a decade: I would *very* much like to know you better."

"Are your intentions honorable?"

"Certainly. I want to sleep with you. Repeatedly if possible." My intentions went much further than that, actually —but some instinct told me to keep my mouth shut.

"Well, I'm not especially sleepy at the moment—but would you like to fuck?"

"*Yes!*" Sudden thought. "Uh, I'm fertile."

"I'm covered."

"You're certainly about to be."

When Mickey Finn reprograms reality, he does so with thoughtfulness and subtlety. The heap of clothes we made stayed dry, but now we could feel the warm rain on our bodies—except that nothing could make it run up our noses even when they were upturned. I didn't notice until after: I was preoccupied. She was warm and soft and limber and skilled and *very* enthusiastic: somewhere in there I started believing in God again just to have somebody to thank.

The distant sounds of my friends' voices came drifting up through the roof, and that seemed correct. One of the greatest pleasures in my life is turning people I like on to Callahan's Place; I get a big kick out of introducing a new friend to my old friends. I had never yet turned someone I *loved* on to Callahan's, simply because in the last dozen years I hadn't come to love anyone that I hadn't met in Callahan's, but I expected it to be at least twice as nice—and I already knew that I loved Mary. I was beginning to be *in* love *with* her (if you get the distinction), the first time I'd been in love since I killed my family, and the prospect of introducing a lover to Mike and the gang sounded heavenly. Just a sliver of a thought, this, that resonated every time the faint sound of a familiar laugh reached me, a warm certainty that there could have been no finer place to fall in love, and to make love for the first time, than where I was.

God, she was a sweet pillowy armful! I've had a few of the bony women everyone else claims to like: nothing to squeeze, nothing to admire, I had to be careful with my weight, I was afraid to let go for fear I might bruise something, and even so my pubic bone got sore. A woman like Mary, now: you can *roll around* on a woman like that. You can let yourself go, secure in the awareness that the system is roomy and cushioned, and you can explore forever without running out of things to see and appreciate, and you find, time after time, so often that I'm tempted to say always, that passion and compassion and sensuality each double for every pound above so-called "optimum weight." Take your skinny women and stick them up the same receptacle with hard beds and cold showers and red-line exercise

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and "natural" food and all the other things everyone earnestly pursues in the belief that pleasure and pain are nature's diabolical attempts to trick us, that the less you enjoy a thing the better it must be for you; take 'em and stick 'em, and give me something a man can enjoy!

Our lovemaking was about as good as a first time can be. It was not the telepathic experience it could become with practice and study, of course —perhaps even less so than a simple sporting event might have been. I spent most of my time in my own head, startled by the unexpected magnitude of my own need, and then bemused by the discovery that hers was even greater. The urgency/tenderness ratio definitely tilted to the left, and there seemed to be some question as to who was raping whom. It got pretty athletic in spots. (Doubtless noisy as well, though I'm sure the rain blanketed most of it.) Most of the information that we passed back and forth came directly from the spinal column or just a little bit higher up.

But tenderness was in there too, and caring, and sharing, and something oddly like nostalgia, and so all in all it was about as nice a last time as you could have asked for too. Our afterglow-durations synched, which is always nice, and we picked little roofing-pebbles from each other's backs like monkeys hunting lice. In the process we magically dried out again. It turned out that we both smoked the same brand of cigarette, but when we took two from the pack, Finn's magic selectively failed and they soaked through. We wasted two more before giving up, then I cautiously experimented and learned that a joint was immune. Opinionated man, Finn—but maybe he knows something. We dressed while we toked, and when we were dressed we started drifting over toward the stairwell.

I stopped. "Mary, let's not go down yet. Once we do it'll be wall to wall introductions and smiles and drinks and toasts. I want you to meet my friends —but I haven't had a chance to get to know you yet."

"As the old joke goes, it's been the equivalent of a formal introduction."

"You know what I mean. I don't know where you live or where you grew up or what you want to do with your life or how many husbands you have —hell, I don't know your last name!"

"I don't know yours."

"My point exactly. The inmates downstairs, lovable and extraordinary though they be, will keep—let's talk."

"Let's talk later; you know we will. Right now I want to go where there are lights on."

"Yes, but—"

"I want to check the staircase over one more time, too."

"—it's perfectly—"

"All right, I want to hear people admiring it."

"—you don't—"

"I want a drink."

"—I bow to superior intelligence."

Warm light and happy noise and the smell of good suds came flooding out the opened door; as we descended the stairs the sour, oddly pleasant aroma of Callahan's everpresent El Ropo cigars joined the mix. Under the laughter and talk, Fast Eddie Costigan was playing Mac Rebennac stuff, and occasionally one patron or another would scat along

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with him. Noah Gonzalez was working on a gag he'd picked up from Al Phee, juggling full shot glasses, and by God he finally had it down cold. A small cheering section had gathered; while they clapped, Noah started sipping from the shots as they passed his face. (Noah works for the Suffolk County Bomb Squad, which is why one leg is artificial, and a merrier man you'll never meet.) Mary and I joined the onlookers; true artistry is rare. Noah drained two tumblers, spilling no more than a teaspoon or so on himself, then swallowed, wiping his mouth without losing rhythm, and hollered out, "Open wide, Drink!"

Long-Drink McGonnigle never blows a cue. "Hit me," he cried, and opened his mouth wide.

This is what I think I saw: the shot glass still containing whiskey went up one last time, tilting this time in stately slow motion so that the contents *almost* spilled; then it came down, and Noah caught it, stopped it cold with three fingers, the contents departed on a high trajectory, Noah flung it back into the stream of traffic so that it made up the lost time, we held our collective breath—and the Drink whipped his head two inches to the left and the flying booze impacted squarely against the back of his throat. A roar went up, and Noah laughed so hard he lost all three glasses, and—perhaps most magnificent of all—Long-Drink did *not* lose so much as a drop of the load.

So rarely in life are we privileged to be present at such a moment. When I was ten, my family spent a summer vacation puptenting around New Hampshire, and inevitably we took the cog railway up Mount Washington, a journey itself worth remembering, but what I will never forget as long as I live is standing at the lookoff railing with the family, admiring the view while trying to keep from being blown over the edge by the fierce mountaintop wind, and the truly beautiful thing that happened then. Dad's hat blew off, before he could even try to save it, and sailed out over an indescribable gulf, bound for the state of Maine with every chance of making it. He'd been a little grumpy earlier that day, and had regained his good spirits by force of will only a short time earlier; the rest of us made small cries of dismay as we watched his hat recede. So did several bystanders. But Dad was heroically determined to keep his good mood: he forced a smile, and even essayed a joke. "Don't worry," he called above the wind. "There'll be another one along in a minute." He put up his hand as if to pluck a hat from the sky. And a hat flew into his hand.

This, you may say, and I will agree, is a wonderful thing, a marvelous thing. But the *beautiful* thing, the thing that came back to me again and again during my stormy adolescent battles with Dad and kept me from ever really hating him, is what he did then. He caught the hat, smoothly, and without the slightest hesitation placed it on his head, pokerfaced. Even the fact that it was a perfect fit did not faze him. "You see?" he said, and held a deadpan all the way through the ensuing ovation. I've always loved and admired my Dad, but in that two or three seconds he became immortal.

Some moments are golden, is what I'm saying, and what Noah had just pulled off was one of those, somebody

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playing above himself. It made me feel awed and happy and grateful. Callahan's Place had done me proud, serving up some magic for me just as I brought Mary in the door to meet it. After the inevitable storm of glasses had shattered in the fireplace, I joined the throng of people who wanted to buy Noah and Long-Drink a drink. We were all disappointed, as Callahan had caught the act and announced that the boys' tab was covered for the night—but I was mildly annoyed to notice that Mary too had offered the pair a drink . . . from a flask. She had insisted on coming down here, putting off our getting to know each other (*other* than in the biblical sense, I mean), because she wanted a drink—which she'd had with her. We could have sat up there on the roof and killed the flask together, talked for hours before coming downstairs. . . .

Hush, I told myself sensibly. Sexual intercourse vests no property rights. And how could I resent any combination of circumstances which had allowed me to witness the triumph of Noah and the McGonnigle? All around the room, people whose attention had been elsewhere were getting the tale secondhand and kicking themselves. Let it go, Jake—

"That was special," Mary told me, grinning and taking my hand.

"Yes indeed. Noah claims he's working up a routine with live chainsaws, and now I think I believe him. What'll you have?"

She sniffed the air. "Do I smell coffee?"

"Jamaican Blue Mountain. Mike has friends in Tokyo. And, anticipating your next question, he also has Old Bushmill's, distilled in Ireland, and fresh whipped cream, and he knows how. Come on."

Callahan was working up a sweat behind the bar when we got there, but he stopped short as he came past us with twelve drafts in his big hands and said to Mary, gesturing in my direction, "Mary, if your tastes are as simple as this you might be interested in dating *me* sometime."

"What can I do?" she said. "He's got the negatives. But thanks."

Callahan wrinkled his big broken nose and grimaced. "Damn. Jake, what'll you charge me for a print?"

"Sorry. The rights are tied up. Mike, you sure picked a good staircase-putter-inner. You *do* know where that thing came from?"

"Sure do," Callahan said. "I made a point of asking Sally for it when I heard she was closing. Yeah, Mary does good work. What'll you folks have?"

"God's Blessing on us both, Mike," I told him. He nodded and went off with his dozen overdue beers.

Mary was smiling broadly. "I *like* this place, Jake."

"I already knew you had good taste. Pun intended."

"Ouch. You did warn me."

"Around here we don't even wait for straightlines."

"Well," she said, absolutely poker-faced, "the shortest distance between two puns is a straightline," and helped herself to some peanuts from the free lunch.

I felt like I had the time I was coming on just a little to a stranger about what a hot guitarist I was, and discovered too late that I was talking to Mr. Amos Garrett. (Remember the demonic guitar

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break in Maria Muldaur's "Midnight At the Oasis"? *That* Amos Garret . . .) "And the success of any pun," I tried to riposte, "is in—"

"—the *oy* of the beholder," she finished for me.

Hmmm . . .

Mike returned with a pair of Irish coffees. "Two God's Blessings," he announced. "I could swear I still hear rain—but you two are bone-dry, and I don't see a brolly."

"Finn's doing," I explained, and he nodded. "Say, Mike, where do you know Mary from? And how come you never invited her around before?"

"Long story. Excuse me, will you? It's time to get the evening started."

He emptied a glass that Shorty Steinitz had foolishly left unattended and banged it on the bartop. "All right, folks—Tall Tales Night is now in session. Who's first?"

Ralph Von Wau Wau was pushed forward by the crowd. "I do have a mildly interesting story for you all," he said, and I glanced at Mary to see how she would take it. I mean, I suppose it's a subjective thing, but I find a talking dog to be more intrinsically startling than a seven-foot flying cyborg. But she didn't blink. Well, I had warned her.

In that charming German accent of his (he *is* a Shepherd), Ralph told a fairly complex story about a demonically possessed lady of his acquaintance whom he had exorcised after even a Bishop had failed; the yarn built to the line, "Possession is nine points of the paw," and produced some very canine howls of agony from the innocent bystanders.

Which of course only inspired Doc Webster. "Damned if I'll be outpunned by a genuine son of a bitch," he boomed, and folks made way grinning for him as he stepped forward. Physically the Doc resembles a Sumo wrestler gone to fat. He is the All-time Punday Night Champion and probably always will be; only Long-Drink and I still cherish a hope of supplanting him any more.

"As many of you know," the Doc began, "I just got back from visiting Juan Ortiz, an obstetrician friend of mine in Los Angeles. He was nominally on vacation, but one day there was an emergency delivery he just had to attend, so he deputized his brother-in-law Obie Stihl—honest to God, that's his name, I'd never make up a name like that—deputized Obie to show me around town. We went to Disneyland. Obie turned out to be a dedicated *Star Wars* freak, with a sense of humor even more depraved than my own—we passed by three sailors on the way in, for instance, and when he noticed they were all Chief Petty Officers, he made sure to point out the 'Three C.P.O.s' . . ." [sounds of gagging and dismay from the audience.] "So he took me to Adventureland, where you go on a Jungle Boat Ride. Robot hippos come up out of the water and spit at you and so forth." "Maybe they were relatives of yours," Long-Drink murmured, and Callahan shushed him.] "But the worst part was the damned boat captain. Through the whole voyage he kept up a running monologue that had shin splints: bad jokes, worse puns, mother-in-law jokes even. I was in severe pain; fella thought he was a real hot dog. But the wurst was yet to come." [Gasps.] "As we got back to the wharf, just as I was stepping

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off the boat, Obie leaned over and whispered in my ear, "Now you're getting to see the dock side of the farce. . . ."

A roar of collective anguish went up, and glasses began to fly toward the hearth. "Rest of us might as well fold up," Tommy Janssen said. "That's a winner."

"Strictly speaking," Callahan said with some reluctance, "I'm afraid it ain't. That story'd probably take the honors if this was Punday Night—but I don't really see it as a Tall Tale."

"He's right," Long-Drink said. "It's nice if the Tall Tale ends with a crime like that, but the Tale itself has to have fantastic elements to it. Sorry, Doc: syntax error."

The Doc frowned, but what could he say? They were right. And then divine fire touched me, as it had Noah a while earlier.

I wanted to impress my new love, and I wanted to help Doc Webster, and it just slipped out before I knew I was going to speak: "I'm surprised at you boys. The fantastic element in that story is staring you all right in the face."

Even the Doc looked puzzled. "How's that, Jake?" Callahan asked.

"Well, how many of you have ever toured Disneyland, or anyplace else, with a fictional character?"

The Doc was the only one who saw it coming; his frown left.

"Doc *told* you who his guide was: O.B. Juan's kin, Obie."

A frozen silence. Group catatonic shock. And then Ralph began to howl, and was joined by the rest. Every glass in the room, full or empty, began a journey whose terminus was the fireplace; Eddie tried to play the *Star Wars* theme but was laughing so hard he couldn't get his hands to agree on a key; Callahan reached threateningly for a seltzer bottle; Doc Webster shook my hand respectfully.

I glanced around for Mary to see if she was suitably impressed, and found her staring across the room. I followed her gaze, realized she was staring at Finn—and realized that Finn was in some kind of trouble.

He was sitting bolt upright in his chair, which he hardly ever does, being so tall, and he was paying no attention to the proceedings around him, and tears were running down his face. The last time I'd seen tears on Finn's face, years before, the planet Earth had been in serious jeopardy . . .

He got up and walked stiffly to the bar, and Mary and I moved wordlessly to where we could see what Finn was doing.

He was offering Mike Callahan ten singles. He wanted ten of something. Callahan was looking him over. "How much effect will that have on him?" Mary asked in a whisper.

"About like you or I gulping a double."

"Oh." She relaxed slightly.

"But it is *extremely* out of character for Finn. The last time I saw him order ten drinks was the first night he came here, years ago."

"*Oh.*"

Many others at or near the bar knew the story; an audience was developing as Callahan reached his decision. "What'll it be, Mickey?"

"Rye, Michael." Just like that night.

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"You want to talk about it?" Callahan asked.

"First the toast."

Callahan nodded at that, and set to work. He builds drinks the way Baryshnikov dances. Ten shots of rye soon sat before Finn. One after another the tall alien downed them. That first night he had thrown each individual empty into the fireplace and made the same toast ten times; this time he didn't bother. When he was done, some of the empties weren't even touching—but he picked the last one up and the rest came with it. He walked to the chalk line, faced the hearth. By now he had our attention.

"To my people," he said clearly and tonelessly, and flung the cluster of glasses.

I hadn't known even Finn could throw that hard: there was a violent explosion in the fireplace. It is designed like a parabolic reflector, so that it is nearly impossible to make glass spray out of it; nonetheless that bursting should have littered the room with shards. It did not for the same reason that my clothes were dry.

"Jesus, big fella," Long-Drink said. "What can we do?" There was a vigorous rumble of agreement on all sides.

Mickey Finn came back to Earth—an expression perhaps uniquely appropriate here—and looked around at us gravely. His composed features were at odds with the droplets running down them; I had the crazy thought that these were the raindrops that had failed to fall on him, time-shifted somehow to now. But of course it was just that Finn's still not used to hanging human expressions on his pan, and tends to forget in times of crisis: he truly was hurting.

"My friends," he told us, "if I could think of anything you could do, I would surely tell you. Would surely have told you before now."

"Then tell us the problem," Tommy Janssen said. "Maybe we'll come up with something."

Finn tried a smile, a poor job. "I doubt it, Tommy. I have been thinking about this particular problem since I first came here, years ago, and I do not think there is a solution."

Callahan cleared his throat, a sound like a speeding truck being thrown suddenly into reverse. "Mickey, as you know, I don't hold with pryin' in my joint. If you don't feel like telling us your troubles, I'll coldcock the first guy that asks a leading question. But I strongly recommend that you unload. Little thing you might not know, having spent so many centuries alone out in deep space: sometimes, just naming your burden helps. But it's up to you, pal."

Finn thought it over. "You may be right, Michael. You always have been so far. In fact, you have stated my problem. *I am alone*. I have been alone for centuries. I shall always be alone, until my death comes."

"The hell you say," Long-Drink burst out. "Why, counting the regulars that ain't in tonight, I make it about a hundred and fifty close friends you've got. You can stay at my crib any time, for as long as you like, and the same goes for the rest of us, ain't that right?"

There were universal shouts of agreement. Finn smiled a pained smile. "Thank you all," he said. "You are

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true friends. But your generous offer does not speak to my problem. I did not say I was lonely. I said I was *alone*."

"Mickey," Josie Bauer began silkily, "I told you once already—"

"Again, thanks," he said, sketching a gallant bow. "But it would, forgive me, hurt more than it would help."

"Hurt how?" she asked, not in the least offended.

"Physically, for one thing, it would hurt *you*. You recall the Niven story you lent me once, about Superman's sex life?"

" 'Man of Steel, Woman of Kleenex,' sure," she said. "*Oh.*"

"Yes," Finn said sadly. "Orgasm involves involuntary muscle spasm—and while I am not as strong as Superman, I am much stronger than a Terran man. And you are slightly built."

"Oh."

There was something peculiar about Finn's face. The eyes, that was it. His eyes hadn't looked like that since the first night he'd come here. Hollow, burnt out, empty of all hope. Why hadn't they looked like that up on the roof? Or had I just failed to notice in the dark, distracted by lust? "It would hurt me too," he went on. "Not physically—spiritually. Human females often become angry when I try to explain this, Josie, *please* do not be offended, but would it not be fair to say that what you were just about to offer me was a transient sexual relationship?"

"Now, hold on a goddam—"

"I *said* 'Please,' Josie."

"—uh . . . dammit, Finn, I didn't mean a purely sexual—"

"Of course not; I do not believe myself that there is any such thing. No doubt it would have involved friendship and laughter and kindness and several other wonderful qualities for which you Terrans do not yet have words. But is not the key word 'transient'?"

"Well, for crying out—"

"I am wrong? You were proposing marriage?"

Josie shut very quickly up.

"Perhaps your subconscious intent was a liaison of days, or weeks, or even months. But I am sure that you were not offering to become my *mate*. No human ever would."

"Christ, Mickey, don't run yourself down. I don't happen to be the marrying kind, but I'm sure that some nice g—"

"Look at me," he roared suddenly, and everyone in the Place jumped a foot in the air. Deliberately, he pulled open his black sports coat, pulled open his shirt, pulled open his chest . . .

I tried to look away, could not. I tried to fit words around what I was seeing, could not. I tried not to be horrified, could not. A strange sound filled the room: many people sucking air through their teeth. I can't describe it, even now: take my word for it, whatever was inside Finn's chest, human beings aren't supposed to see things like that. Ever.

Finn closed up his chest.

A collective sigh went up.

"I have shown you my heart," Finn said softly. "Will you marry me?"

Josie began to whimper.

"Josie, I am sorry," he said at once, but it was too late—she was out the door and gone. He said a word then which I've never heard before and hope never to hear again, something in his native tongue that hurt him worse than it did

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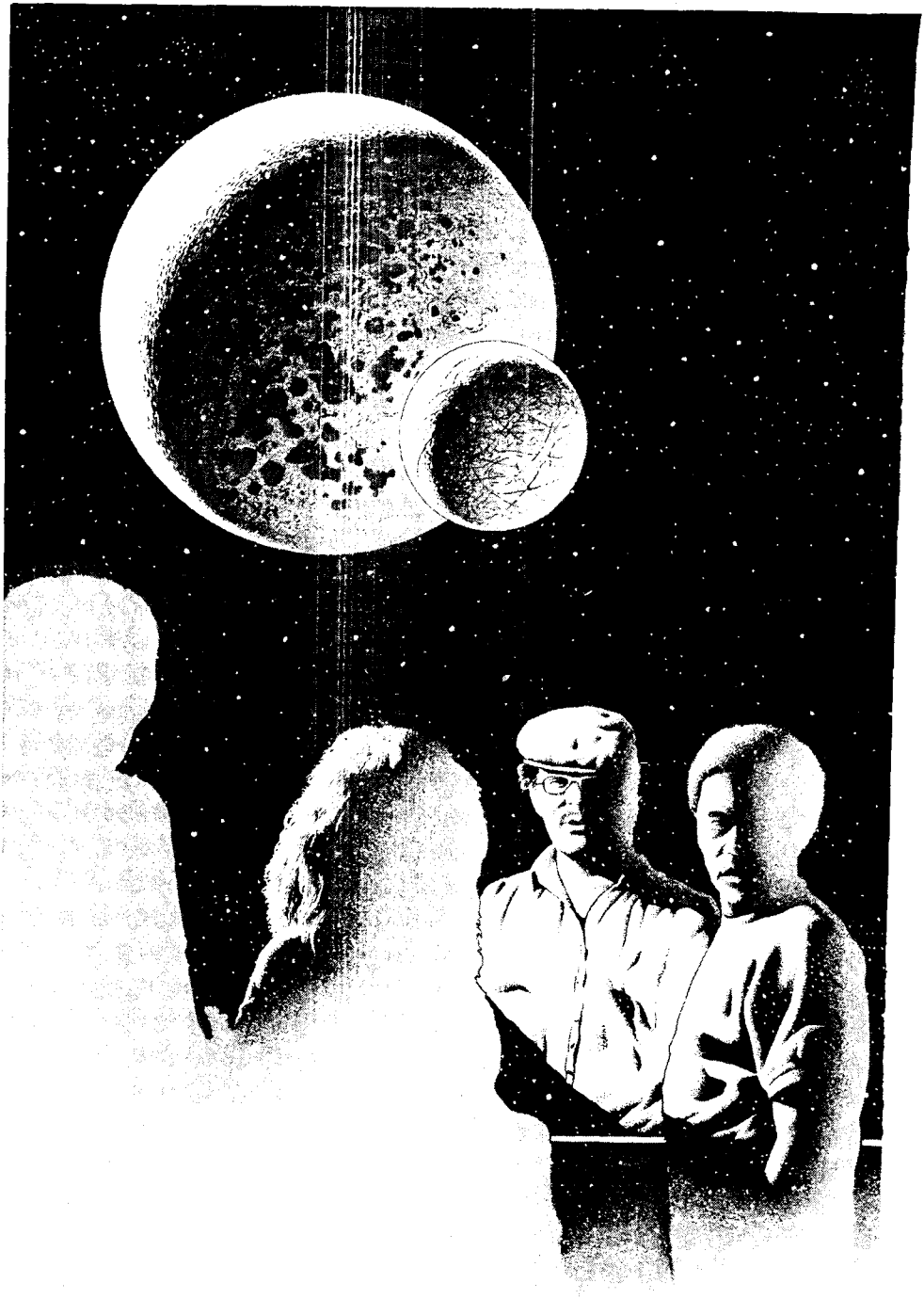

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us. Josie's a real nice lady, and Finn knew it.

Callahan cleared his throat.

"Mickey," he rumbled, "you're alone, we get it now. It's a hard thing to be alone. Everyone in here has been alone, some of us are now—"

"Not as I am," Finn stated. "Even the most unfortunate of you is less alone. No matter how remote the chance of your finding a mate . . . there is always the *chance*. Always *you* have hope, even as you despair. No human will ever pair-bond with me—and I dare not leave your planet. My Masters believe me dead; if they ever learned otherwise—"

"—they'd kill you," Long-Drink finished.

"Worse."

"They'd punish you."

"Worse."

"What's worse?" Shorty Steinitz asked.

"They would put me back to work, unpunished. They are not like humans, who sometimes kick a machine that is not working. They would simply restore the machine to service. And, as an afterthought, they would exterminate the organisms which caused the machine to malfunction."

"Us, you mean," Callahan said.

"Yes."

Mary and Callahan exchanged a look I didn't understand. "There's no chance you could sneak back to your home planet without these Master clowns catching on?" she asked Finn.

"None whatsoever," Finn said expressionlessly. "To begin with, my home planet no longer exists. It has not existed for several centuries, and I am the last of my people."

Mary winced. "What happened?"

"The Masters found us."

"Jesus—and killed everybody but you," Tommy Janssen said.

"They killed everybody *including* me. But the Masters are a prudent and tidy race; they always keep file copies of what they destroy, each etched on a molecule of its own. Like all of my people I was slain, and reduced to a single encoded molecule. Some time after my death they felt need of a new scout, fashioned this body, and caused to be decanted into it a large fraction of my former awareness—withholding the parts that did not suit them, of course."

Mary gasped; she was horrified. "God, you must hate them."

Finn's voice was bleak. "I wish greatly that I had the ability. That is one of the parts that did not suit them."

I was as horrified as Mary. As a rule, Finn is disinclined to talk about his past, and of course none of us had ever tried to pry. I'd always wondered how he'd gotten into his former profession. Now I was sorry I knew.

Still I was tempted to ask him the other thing that had always puzzled me: why the body he wore looked human. Was human stock ubiquitous through the Galaxy? Had his Masters designed him specifically to come *here*? Or did he somehow reform his body for each new planet, each new culture? I knew that at least half his body was organic—but did that half have anything in common with the body he had been born into?

Perhaps the answer was equally hor-

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rifying. In any case, my friend Finn was in pain: this was no time to be snoopy.

"Mickey," Mary said softly, "if you are unable to hate your Masters . . . then you are unable to love them. Yes? That's why you were able to betray them."

"Yes. They do not wish to be loved. They would find the idea disgusting. Love baffles and repels them, they stamp it out wherever they find it in the Galaxy. The Masters are motivated by self-interest."

"So are most humans," Mary said.

Finn actually laughed. "Excuse me, Mary my new friend, but what you said is funny. *All humans—without exception—want to love*. No organic or emotional or psychological damage can remove that need. Humans can survive, albeit in pain, without *being* loved—but lock a man in a dungeon and he will find an ant to love, or try. The sociopath, who feels no emotions, wishes he could, and is driven mad by his inability. Love is the condition in which the happiness and welfare of another are essential to your own. To any rational selfish mind, this is insanity. To a Master it would be obscenity: perhaps the corresponding horror for a human being would be ego-death."

"Love *is* ego-death," Mary whispered.

"The Masters have run across love from time to time in their expansion through the Galaxy. They're not at all afraid that it might infect *them*, nor do I believe that to be a possibility, but they always exterminate it with a special pleasure, a *frisson* of horror, a small thrill of disgust." Finn closed his eyes briefly. "It was the flaw for which my race died."

The Place was silent. Mary's fingers were digging painfully into my arm, and I couldn't protest because I was gripping her arm just as hard. Why was she glaring at Callahan?

"When first we encountered the Masters, we considered the problem they represented and evolved two possible solutions. One involved their complete annihilation, root, stock and branch; the other was more risky. We loved Life, and especially Sentience, and they were sentient. We took the risk and were destroyed. Perhaps it was the wrong choice.

"In any case, I am nearly all that remains of my race, and so I am disinclined to die. I can neither love nor hate my Masters, but I can fear them . . . and do."

"It must have been hard for you to quit them," Mary said.

"Yes, but not because of the fear. That came later. It was hard because I am only partly organic. I contain installations, which were programmed by The Masters. Betrayal was almost a physical impossibility for me: I was *counterprogrammed*. With an effort that burned out small components and may have taken a century off my lifespan, I was barely able to *hint* at how my programming might be circumvented —and these my friends were able to interpret my hints and act on them."

"Aren't your . . . Mick, I'm sorry, I just can't use that word. Aren't the Cockroaches likely to notice you're gone and come looking for you?"

"No, Mary. Not if I remain within this solar system. The Galaxy is a big dark place, and the . . . Cockroaches,

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being rational, are cautious. If a scout fails to report in, the area he was exploring is left alone. My defensive systems are mighty; it would take a powerful enemy to destroy me without my consent."

Callahan set up another five shots. "Finn," he asked, "tell me if it's none o' my business, but is it possible for you to suicide?"

"No, Michael. Or I would have done so, before I ever came to your tavern that first night." He downed two of the shots. "But, as with my loyalty to the Cockroaches . . . thank you for that name, Mary . . . my will to live can be tampered with slightly. I could not suicide—but given the right conditions and a strong enough motivation, I could cooperate in my assassination." He finished the remaining shots. "You will recall that on that first night here, I begged you all to kill me."

"No, Mickey," Callahan said softly. "I don't recall that." He trod his cigar underfoot and lit a new one. "I don't ever plan to, either. One more personal question. You don't have to answer it."

"Of course, Michael." The glasses hit the hearth.

It was a ten-cent cigar or worse, but Mike took his time getting it lit properly. "You said, 'strong enough motivation.' " Puff. "Tell me, buddy . . ." Puff. ". . . is loneliness a strong enough motivation?"

Not a chair creaked; not a sleeve rustled; not a glass clinked. The fire seemed to quiet in the hearth; the rain seemed to have stopped. Somewhere in there Mary and I had lost our grip on each other's arm; I wanted to get mine back, but something told me to stay still.

Finn sighed finally, and put ten more singles on the bartop. Callahan handed him a fresh fifth, and while he was drinking off the top quarter of it, Callahan said quickly and quietly, "Mickey, once upon a time you had a problem you couldn't solve, and dying looked like the only way out. But you kept on looking for another way out, and in the proverbial nick of time you found one."

Finn wiped his mouth with his long forearm. "Michael, I have been looking for a solution to this problem for a long time. All the time I have been on Earth. I think very quickly. In the same amount of time I could have deduced this solar system from one of your cigar stubs."

"Mickey," Mary began, and then caught herself. "Mickey Finn isn't your real name, is it?"

"Yes, it is, but in the sense you mean you are correct: it is not the birthname my mother gave me."

"What is your birthname?"

Finn smiled sadly. "You couldn't pronounce it."

"Try me."

He started to argue, but gave in and spoke his name. When I'd heard it I agreed with him. The closest I can render it is "Txffu Mpwfs." Whatever Finn's people had been like, I was sure their mouths were constructed differently than ours.

Mary got it dead-bang perfect the first time. "Txffu," she said, "weren't you just as lonely, or lonelier, when you worked for the Roaches? It must be a long time between star systems."

Finn blinked at hearing his name on another's lips for the first time in—how long?—but was distracted by her question. "For one thing, there was always

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the tiny but measurable possibility that the . . . the Roaches might have reactivated others of my race to become scouts, that I might, if I lived long enough, chance to meet such a one eventually, that we might—" He broke off and did more damage to his fifth. "There was hope. Microscopic hope, perhaps, but hope. But now I must stay here, and no other of my race will ever come, and there is no hope."

He looked at the bottle. It was almost empty. Perhaps he sympathized with it; he put it down unfinished. "And when I worked for the Mas—for the Cockroaches, I had a job. A function. A purpose. A less than totally desirable one, admittedly. But I was part of something greater than myself, and I had a role to play. What is my role here on Earth? I have tried to anchor myself to this planet, to 'put down roots'—I have pursued farming and fishing and hunting and several other most basic trades. I can imitate a terrestrial organism in general and a human in particular.

"But I am alien. I have no purpose here, no job which needs me to do it. This makes my loneliness all the sharper. Perhaps I could stand loneliness if I were not useless; perhaps I could stand uselessness if I were not lonely." His voice was eerily calm and flat as he finished, "The two together are more than I can bear."

The silence that ensued then was a familiar one. Someone names a problem —an act similar in many ways to giving birth—and then the rest of us sit around a while in respectful, sympathetic, contemplative silence, admiring the newborn little monster and meditating ways to kill it. Although it's difficult to read a man who has facial and vocal expressions and body language only when he remembers to, I felt that Finn had completed his birthing, and I put my mind on solutions for his problems. This was going to be one of the longer silences.

I've tried my hand at matchmaking a few times, and learned that you should approach it like walking into a chemistry lab and mixing two unidentified beakers of chemicals: you might luck into a stable compound, or you might blow your hands off. I'm willing to take the risk for a good enough friend, and Finn qualified—but where do you find a mate for someone as uniquely alien as him? And in today's job market, how much demand was there for a fellow whose principal prior job experience involved locating and destroying civilizations? I came up with a few dozen trial solutions, rejected them all, realized how little chance I had of finding one that Finn had not considered and rejected months or years ago.

But I was being premature. "Txffu," Mary said, "that isn't all of it, is it?"

He spun his head to look at her. Those eyes of his seemed to smolder.

"Mary," Callahan said reproachfully, "that's all he chose to tell us. We don't pry in here, you know that."

"He's asking us to fix two legs of a three-legged stool, Mike. I don't do work like that."

"Then sit this one out. But no pryin' questions in my joint. It's up to him whether to show you his legs or not."

She turned back to Finn. "As a card-carrying Sophist, I will now proceed to make some prying *statements*, and if

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you choose to react to any of them, it won't be my place to stop you.

"The third leg of your stool, you stool, is called fear. I don't mean your fear of The Cockroaches, you've learned to live with that. Something else has you scared, and for some reason you don't want to talk about it. Not because you're afraid to admit you're afraid, like human males; it's something else. I for one would certainly like to hear about it."

Finn tilted his head slightly to one side. "I see further into the infrared than humans, hear an extra octave on either side of human range. Do you see emotions others cannot perceive?"

She ignored the question. "You're stalling."

He closed his eyes briefly—I welcomed the momentary respite—and made his decision.

"Very well. I am afraid of the same thing that everyone in this room is afraid of."

Long-Drink McGonnigle nodded. "Death."

"No, Drink my friend. I do not fear death. Neither do some others in this room. I fear Apocalypse. Armageddon. Ragnarok and Fimbulwinter. I fear nuclear holocaust."

There was a murmur in Callahan's Place.

"Finn," Doc Webster said, "do you have reason to believe that it's coming?"

"No more reason than anyone else here, Sam," Finn assured him. "Is that not sufficient?"

"What's it to *you*, Mickey?" Mary asked suddenly.

"Mary!" I said, scandalized—no, shocked and dismayed.

It was her tone of voice, you see, the way she was coming on strong with Finn. If Callahan had said those words, in that tone, it would have been different. Lots of times I've seen him appear to bully someone into solving their own problem, adopt a gruff, belligerent manner as a way of getting through their self-involvement. The rest of us are a mite too sympathetic sometimes. But when he does it, we all know that it's just Callahan, that he's simply using rudeness, as a way—an effective way—of loving.

But Mary was a stranger here. In a sense she had not yet earned the right to talk that way in here, to a friend of ours. Perhaps if she herself had already opened up to us in some way, aired some problem and been adopted by us, it would have been different. (But that sounded silly even as I was thinking it: what, did people have to show a scab at the door to get admitted to Callahan's Place?) All I knew was that it wasn't right for her to be using that harsh, challenging, almost cruel tone of voice with my friend Finn. And that dismayed me, because it was my first suggestion that maybe I did not know Mary as well as I thought I did.

"I just want to get it straight," Mary insisted. "Mick, Jake told me earlier you've studied a few stars—*from inside*. If you can survive in the heart of a fusion furnace, what do you care about a little thing like Armageddon?"

"It would destroy you and all your kind!" Finn said.

"So? You told us just a few minutes

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ago that the Cockroaches left you unable to hate or love."

"They left me unable to hate or love *them!*" he said forcefully. "I can love. I can love humankind. I do."

"Uh huh," she said nastily, and Finn's face twisted and my heart turned over within me.

"Mary," I said quickly, "You don't know what you're talking about—"

"Shut up, please, Jake," she said. "Mick, why—"

"No, you shut up," I snapped. "He betrayed his Masters for us, he exiled himself here to save us, he *proved* his love—and again when the Krundai came, he fought for us! You don't know, you weren't here, you have no right, you don't know him—"

"Mick is your friend, and you told me about him for fifteen minutes—if you forgot to tell me the important parts it's not my fault. Now I asked you to shut up, and I said 'please.' Look here, Finn, you noble spaceman—"

I shut up and let her browbeat my friend. I was busy trying to fall out of love.

(A rotten little voice in the back of my head was asking, are you sure you want to lose a body like that just to keep your self respect? and I had to admit it was a good, if swinish, question.)

"—If you claim you quit your job out of love for humanity, and you claim to be scared of Apocalypse on our account, then why the hell is it that you haven't done one goddamn thing to prevent it?"

Finn opened his mouth.

"And if you give me the *Star Trek* Prime Directive," she cut him off, "I'll spit right in your eye. Nobody who really cared about the ethics of interfering in the destinies of primitive cultures could ever have worked as an interstellar hit man—conditioning and counterprogramming be damned!"

"It is not that I would not prevent nuclear catastrophe," Finn said. "I cannot."

"Bullshit."

"I can destroy nuclear weapons easily. But I cannot destroy *every* one, simultaneously, and anything less would only trigger the calamity."

"Oh, for Christ's sake, Mick—you're not that dumb. You could think your way around the problem in about thirty seconds flat . . . if you weren't hamstrung by guilt."

"Guilt?"

"That's right. Resolve the conflict in your conscience, and everything else will fall into place, you wait and see."

"—'conflict'?—"

"For years, now, ever since you first walked into this dump, you've been taking credit for saving the world out of love of humanity—and these chumps here bought it." She glared around at all of us, ignored the glares she got in return, and turned back to Finn. "*Why don't you tell us the real reason?*"

And she got him! I was watching his face, and Finn may not have much human expression, but I know a direct hit when I see one. She knew something, she'd seen something we hadn't. I tried to do an emotional one-eighty, and got so disoriented I nearly missed Finn's reply.

At first it didn't look like there was going to be one. He froze up like a computer that's lost its cursor. People speak of someone "turning to stone"—but I don't think any human being could have

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come as close as Finn to doing that literally. Three or four seconds went by like zeppelins in a desultory breeze . . . and then suddenly he was shouting:

"All right, damn it: I am not immortal!"

The volume made the windows ring and people wince. Motorists may well have heard him out on 25A, rain and all. As the echo of his shout died away, Mary said, quite softly, "I figured it was something like that. You're going to be needing maintenance pretty soon, aren't you?"

Finn sighed and spoke in his normal voice. "If I do not receive fairly extensive maintenance within approximately two hundred and twenty years, I will experience critical systems failures. I will die. It is a trick of the Masters, another way to prevent their scouts' deserting as I've done. When I arrived on this planet, I estimated that humanity could possess the necessary technological sophistication within a century or two . . . if it survived that long. If you had been less advanced, you would have been no use to me; more advanced, and you would have detected my approach and perhaps fired upon me. The 'window' was open. Your political immaturity made you a most dangerous gamble—but you were the best chance I had seen in countless millenia. I staked everything on you."

Callahan poured himself a shot of Bushmill's and tossed it back. "What kind of maintenance, Mickey? Organic or cybernetic?"

"Both, Michael. And one other kind for which your people do not yet have a name."

"Why'n'cha just teach it to us?"

Finn shook his head. "Could you have taught Leonardo Da Vinci to build a railroad before it was railroading time?"

"So that first night you came in here, all of that was a charade?"

"No, Michael! Not at all. I meant it when I asked you to . . . well, you say you don't remember that. In any case, you refused to do it then. I was in agony. I realized that I had a chance to survive on this world—but I was programmed to transmit my observations of humanity to the Masters at a present time, and I knew that when I had I would receive orders to sterilize your planet. I could not countermand that programming. The irony was crushing. It was only when you asked me my name that the idea came to me: if I could give you enough hint, you could drug me unconscious and prevent my transmission for me. And I managed to do so, and you took the hint."

"But I mean, you didn't defect and save us for the reason you said, because you learned here that humans have love? You did it because we might get smart enough one day to keep your motor tuned for you? Is that the size of it?"

Finn didn't hang his head; his people must not have had that custom. "My decision was predicated solely on self-interest, Michael," he confessed miserably. "I *was* pleased to find that you had love—because it would make it easier to get you to help me, when one day you could."

Shorty Steinitz was wearing the same look he'd had the day he broke Weasel Wetzel's face-bone—and Shorty *knows* that Finn could outpunch an F-111.

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"Let me get this straight, Finn," he said darkly. "You don't love the human race?"

"Oh hell, Shorty," Long-Drink said. "*I* don't love the human race, comes to that. There's an ever-dwindlin' percentage of it I can *tolerate*."

"All right," Shorty insisted, "this *place*, then, these people . . . Finn, are you sayin' you got no love for Callahan's Place here? For us?"

Finn started to answer, and paused as Tommy Janssen shouldered his way forward. The kid's voice was low and soft and dangerous. "You came in here the night these guys got me off smack," he said, "and you watched them save me, watched while they sewed my balls back on, and then you got up and did your little dance *because you figured it was cheap medical insurance?* I'm the youngest guy here, twenty-five, if I quit smoking I might live another fifty, sixty years—*if* the goddam bomb doesn't go off tomorrow. Some of the other people here . . . hell, Tom Flannery's *died* since the night you came in here. And you're worried about Apocalypse because it might cut you back to another two or three centuries of sunrises? Now, where did I put my violin?"

God help me, I spoke up. "Finn—all these years we've been knockin' our brains out trying to make you feel at home in a strange land, helping you get papers and teaching you about baseball and trying to teach you how to sing and all that . . . all that time you were just *using* us?"

I shut up then, because Finn's feelings had become so violent as to reach the surface of his face. One thing apparently all humanoid life forms have in common: the grimace of extreme anguish.

"***This is not fair,***" he roared, and flung his bottle of rye into the fireplace.

SMASH! Cracks appeared in some of the bricks.

There was a general murmur rising in the room now, but Mary's soft laughter cut right through it, deflating it. I turned, to look at her with new eyes. I resented her for being privy to this intimate matter, for having provoked this hassle, for being cruel to my friend the rotten son of a bitch . . . Pushy, and nasty, and castrating, and *fat* . . .

I transferred to her all my conflict; as I had on the roof, I poured my need into her.

And this time she didn't accept it. I opened my mouth to say something or other that would end our affair, and she ignored me, spoke directly and only to Finn.

"*Now* you're getting it," she said, smiling. "It *isn't* fair. Enjoying it, Mick? Have I given you enough, now? Have you got a way to store it digitally and play it back later? Can you put it on a loop and run it continuously or something?"

He blinked at her.

"You marinate in guilt soup for enough years, you suck all the juice right out of it, have to go get some new vegetables to throw into the pot, that's understandable. But eventually you'll use up this bag. What'll we do next —spread the news around, put you on the Phil Donahue Show? Sooner or later, somebody'd figure out a way to kill you, and you know it too, you big dumb jerk. Can't you make this last you for a while?"

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These were hammer blows she was landing, from a distance of about a foot and a half. I opened my mouth to say something, and suddenly she whirled around to face us. Finn's got a more efficient speaker than any human, but she certainly had an impressive bellow onto her—we jumped further than we had when he let go.

"Will you clowns stop indulging him now?"

The dust settled, Callahan picked his cigar butt up off the floor and blew sawdust off it, and she cut back to about Force Eight and went on:

"What is the *matter* with you morons? A mutt comes in here, a guy you claim is your friend, with a sign on his forehead says, 'Masochist,' and you people get out the whips and chains, is that it? Txffu's committed the cardinal sin, eh? He doesn't love humanity: hang him. And Handsome over there, too, and half the people in this bar, probably . . . what the hell is so special about humanity that not loving it is a sin? Finn said his people loved sentient life: I respect that a lot more, and I'm not at all sure that humanity qualifies, on average—"

(By "Handsome," she referred to Long-Drink, whose name she didn't know, and I found time to wonder if Mary was a pervert like me. Long-Drink is even taller and skinnier than me—put him and me and Finn side by side and we look like a pine mountainside. . . .)

"—How about an analogy: will that strain your brains too much? Say you work for a South American real estate developer; he has you go out into the bush and exterminate tribes of monkeys where he wants to build new condominiums. You don't like the work, you'd rather quit and jungle up, but the boss has thoughtfully planted a booby-trapped transceiver on you. To make matters worse, you're a diabetic, and he only gives you a limited supply of insulin for each trip.

"One day you run across a tribe of monkeys clever enough to disable the transceiver. It may even be possible to train them to manufacture insulin. *Is it necessary that you love them before you can accept their aid?* I could maybe, given time, learn to get attached to three or four individual monkeys, maybe as many as a dozen or so—be amused by them, grow fond of them, even respect them in certain ways. I could see being concerned if I learned that their tribe was locked into some kind of suicidal behavior pattern—really concerned, not just on my own account. But *love* them? Or their kind in general?

"And should I be ashamed for wanting insulin so that I can live another forty or fifty years—when the monks can only hope for ten or twenty? Oh, you jackasses, I can understand *HIS* being that dumb, he's smarter than any of us—but how could you *morons* be so stupid?"

Many feet were shuffled. She had opened up our friend's hidden wound . . . and we had all picked at it. I was belatedly beginning to realize her technique. Sometimes a mocking voice whispers vile things in a man's ear, things he can't shut out because he half-believes they're true. But if you can *personify* that voice, and get him to fight it, to reject it . . .

"He comes from a race so fatheaded noble and ethical that they couldn't

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bring themselves to destroy their assassins—*perhaps*, he says, they made the wrong choice. Naturally he'd feel guilty about exploiting us by trying to keep us alive, about his inability to love monkeys. All the years he's been on this planet, none of you noticed any pattern in the kind of professions he's followed?''

I found that I was speaking. ''I figured he picked basic, earthy trades as a way of rooting himself to this planet. Our primal cultural basics: farming, fishing, watching the forest, contemplating the sea—''

''Solitary, lonely jobs, every one, the way he went about them. Hermit jobs.'' She turned to Finn. ''You probably find most of us actually repellent, don't you, Txffu?''

His face was expressionless again. ''Candidly, yes.''

''Physically disgusting?''

''Well . . . deformed, on the average. Your males are all so *short* . . . and your females are all so undernourished. . . .''

Her ears grew points. ''Really?''

''Yes. Among my people, you yourself would be considered—well, not emaciated, but almost unfashionably slender. As it happens, I have an unconventional taste for slender women . . . but most human females your size hate themselves so much it is unpleasant to be near them—''

''Txffu?'' she interrupted.

''Yes, Mary?''

''Will you marry me?''

I screwed my eyes so tight I saw neon paisley. Somewhere behind their lids was the switch that would turn my breathing back on, and I had to find it pretty quickly.

Finn was utterly still for five long seconds. ''You are not serious.''

''No, thank God, and that's going to be a break for you in the years to come—but my proposal is dead serious. What's your answer?''

''But you—''

''Finn, you've been unable to love because you haven't loved yourself because you haven't loved us—it's time somebody got you off the loop. You ninny, of course you didn't save us out of love! You did it out of *compassion*. That's something that's underrated, but I think it's just as good as love—who knows, maybe better. You can love only your equals—with your superiors or inferiors, compassion is the best you can do, and it's pretty damned good, at least as high up on the ethical scale. With time, it can lead to love. I speculate that it could even be the basis of a pretty fair marriage. Do you think?''

''You saw what is in my chest—''

''Yeah, I'm fascinated. Is there an owner's manual for it?''

''You cannot be serious. You do not even know if we are sexually compatible—''

''The hell I don't. I can see fingers and a tongue from here; anything else is gravy. And I've got *some*thing or other that appeals to you; I knew that back up on the roof when I met you.''

That switch had to be around here someplace; just a question of finding it . . .

''—we are not cross-fertile—'' Finn tried.

''What of it? Maybe we'll adopt. Hell, we'll adopt this whole goddam

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bar—they need *someone* to bring 'em up. Quit stalling: yes or no?"

I think maybe I'd known it all along, sensed it up there on the roof when Finn first flew out of the rainy night. I suppose there are worse ways to say goodby. . . .

"Yes," Finn said finally. "Yes, Mary, I would be honored to marry you. On one condition." He turned to the rest of us. "*All* of you must agree to be my Best Man."

A roomful of people looked guiltily to Mary.

She nodded serenely. "Deal."

A cheer went up that rung the rafters. I even got my lungs going in time to join it. Sure it hurt.

But it felt good, too.

Finn's face remained blank for another few seconds—and then he remembered to share his joy with us, and hung that expression on himself; I was pleased and proud that he took the trouble.

"Would you two," Callahan boomed, "do me the honor of gettin' married here in my joint? Say, over there on the staircase?"

"Where else?" Mick and Mary said together, and another cheer went up, even louder.

It came to me that I might find some use for a bucket of alcohol, so when Callahan began the bucket brigade of free drinks for the house I hogged three or four. It's amazing how fast you can throw down booze if you work at it, and so before long I found myself bellying up to the bar.

"Inn keeper," I said when he reached me, "give me drink."

He understood my situation—had probably understood from the moment Mary popped the question. Not much gets past Mike Callahan, and nothing that pertains to the human heart. "Healthy reaction," he said, nodding judiciously. "I think you'll live, Jake."

"Have you ever hated your best friend's guts, Mike?"

"Careful, pal: don't get into the same kind of guilt-loop Finn did. Melodrama is for TV. Finn's not your best friend, just a garden variety pal. And if you feel like hating him for a while, go to it; it'll pass."

"You haven't said much tonight, Mike. How do *you* feel about all this?"

"Well, the way I look at it, I'm not so much losing a daughter as I am gaining an alien."

I stared at him, and by the time all the tumblers had finished clicking into place, he was handing me an oversized mug of Irish coffee.

"Mary is your—"

"Lady Sally and I have always been real proud of her," he said contentedly, puffing on that miserable stogie.

"Why the hell didn't she ever come around here before?" I asked. "All these years—"

"Well, she couldn't, Jake. She lived too far away, and she used to work nights. Until Sal retired . . ."

You burn your tongue when you drink Irish coffee too fast, so I burned my tongue. So I had another to keep my tongue numb, and then another, and I started having so much fun that the idea sort of caught on generally, and that's more or less how Mike and I and about a dozen of our friends eventually ended up naked in the rain on Callahan's roof, me for the second time that night.

Do you know, from that day to this, rain won't land on me—or any of us that were there—unless we ask it to? ■

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the reference library

By Tom Easton

Footfall, Larry Niven and Jerry Pournelle, Ballantine/Del Rey, $17.95, ? pp.
The Darkling Wind, Somtow Sucharitkul, Bantam, $3.50, 400 pp.
The Alien Swordmaster, Somtow Sucharitkul, Pinnacle, $2.95, 185 pp.
Eros Descending, Mike Resnick, Signet, $2.95, ? pp.
The Inn of the Hairy Toad, Mike Resnick, Delta Con, $3.00, 41 pp.
The Book of Kells, R. A. MacAvoy, Bantam, $3.50, 352 pp.
The Kif Strike Back, C. J. Cherryh, Phantasia Press (13101 Huntington Woods, MI 48070), $17.00, 294 pp.
The Secret of Life, Rudy Rucker, Bluejay, $14.95, 246 pp.
Benchmarks: Galaxy Bookshelf, Algis Budrys, Southern Illinois University Press, $19.95, 351 pp.

A few columns ago, I ingenuously asked whether Tom Robbins might not be the S. Morgenstern who wrote *The Silent Gondoliers*. Well, now I know the truth. He isn't. Judy Lynn Del Rey of Ballantine/Del Rey called to tell me the real man behind *Gondoliers* is William Goldman. By now, of course, you and all the rest of the world know this truth. Del Rey has brought *Gondoliers* out in paperback, with Goldman's name prominently displayed.

So buy it already. Who wrote it doesn't really matter, does it (except to the author)?

It may not be "the finest novel of alien invasion ever written," as the jacket copy promises, but it is almost certainly the longest, the most elaborate, and the most carefully worked out. It may also be the most publicized SF book of the year, and a best seller, and it just may become a Hollywood spectacular. It's **Footfall,** by Larry Niven and Jerry Pournelle, that team who has learned to mine gold with mainstream treatments of SF themes. With it, they

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may have found the mother lode of every writer's private fantasies, for they have produced a crackerjack good read, a rousing adventure in the classic spirit whose horde of minor characters and obsessive attention to minor events may, though they slow the pace a bit for my own taste, only increase its appeal to encompass those readers who dote on heavy historicals and intricate disaster novels.

Footfall begins with the discovery that an alien ship is approaching Earth. The aliens' motives are, of course, unknown, but even as Americans and Soviets begin to cooperate in the face of possible threat, the U.S. government assembles a "Threat Team" of hard-science SF writers—among whom we can recognize Heinlein, Niven, Pournelle, Herbert, and perhaps others—who promptly recognize the technology of their own dreams and spot the significance of the massive object the aliens have cut loose from their ship: They are here to stay, and they probably intend conquest.

And so they do. They knock out the satellites, capture the cosmonauts and the American observers, including Senator Les Dawson, on the Soviet space station, and begin to destroy dams, military centers, and other essential tools of civilization. They land, they slaughter, and they reveal a strange psychology and sociology. They are herd beasts, who act as a group, and their war is a tactic: they seek to dominate, and then to incorporate humanity into their herd.

With the aid of SF writers, the American leadership catches on fairly quickly. With the aid of their captives, the aliens also begin to get a grasp on the peculiar foes they face, but they have no one whose imaginations are so determinedly flexible and expansive. They are handicapped from the start, and though they inflict great damage, the humans have those SF writers for an ace up their sleeve. They are the ones who recall the dream of the spaceship powered by nuclear bombs and noodge the U.S. into building it practically overnight. And of course, *Gabriel* turns the tide.

I will say no more about the plot. You're bound to buy the book, and then to enjoy it. Let me add only that I found the idea of SF writers as a national think tank both irresistable and inevitable—in such a crisis, they might very well be the only ones who would know what was going on! However, the same idea strikes me as just a mite peculiar for a book that will be pushed hard at the mass, non-SF market. The in-references tailor it to our own clan, and they will help ensure it heavy sales among us. Perhaps they will also serve to spread the word and enlarge the clan.

Somtow Sucharitkul's **The Darkling Wind** is the fourth and last of his Inquestors series, and it is in many ways a fitting capstone. *Light on the Sound* introduced us to Somtow's universe as Ton (Inquestor) Davaryush, kingling of Gallendys, presided over the discovery of the truth that hid within Skywall Mountain by Darktouch, sighted scion of a race of blind hunters of the delphinoids whose brains they harvest to drive the Inquest's starships. In *The Throne of Madness*, Kelver, the boy Ton Davaryush was made an Inquestor, loved his fellow apprentices, Siriss and Arryk, lost both, and found the keys to a power that would let him topple Empire. In *Utopia Hunters*, we heard a series of tales, as they were met by the darkweaver Jenjen, that illuminate the Inquest's driving passion, a compassion that murders peace in the name of peace and shatters utopias in the name of progress.

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When I reviewed *Utopia Hunters*, I predicted that Jenjen would play an important part in the next volume of the series. So she does. She is present on her homeworld of Essondras when her greatest artwork is destroyed and Ton Kelver's Shadow Inquest evokes rebellion against the true Inquest's plans to destroy the world. She is present when Siriss's betrayal of Kelver brings Arryk's armada to destroy Kelver's base, and then to destroy the utopia of Shtoma that has long frustrated the Inquest. She is present as the dramatist Zalo, long used to servocorpse actors, (re)invents live theater and memorializes the Inquest and its downfall. She is present as Somtow revisits the scenes of his own earlier artistic triumphs and his major characters from the previous books return to finish acting out their destinies. She vanishes only when Somtow presents us with the illusion that the homeworld of the heart is to be had by self-immolation.

As predicted in earlier books, the Inquest falls. But this tetralogy is no mere adventure, no matter how adventurous it is. It is no war story, no matter how many wars it encompasses. Somtow *is* an artist of the imagination, one of the best working in SF or any other field of literature. Listen to his statement of his basic theme: "Shall we dance in the skies in patterns of cold beauty? Or shall we dare expose ourselves to all that makes us human?"

His faults are those of excess. He *does* overdo the irony and the preciosity from time to time. He adorns his story line, his characters, and the language with furbeloes. He indulges in bad jokes such as his pair of appendices that in mock-scholarly fashion discuss the authorship of the Inquestral saga. Yet all these faults are as nothing beside the scope and sweep of his visions. I admire. I stand in awe. I applaud.

Dare I quibble as well? Yes. Even gods nod, and it behooves their worshippers to notice, lest they forget that they too can accomplish wonders. Let me note that Somtow in at least one spot borrows from Warren Norwood, when he burns the atmosphere of a gas giant planet by hydrolyzing oxygen from ice moons. And once he screws up his biology. A recurring element is his child-soldiers, kids taken from their homes, equipped with lasers implanted within their eyeballs, and sent off to war. One of his semimajor characters is an ex-childsoldier who retains the lasers, and when she weeps, the tears dislodge the lasers so she can no longer defend her lord and master, Kelver. But tears never get inside eyeballs!

What else has Somtow been up to? In a *Locus* write-up, he says he's been having a lot of fun writing "V" novels, each one an episode (from what I can tell) in the aftermath of an invasion of Earth by reptilian "Visitors" who favor long pig for breakfast, lunch, dinner, and sushi. I've seen the first one now—it's **The Alien Swordmaster**—and I can see the fun. The book is vigorous, fast-paced, violent, and simple-minded. Tomoko Jones is about to be raped by the Visitors' chief when a bacterial plague strikes. She escapes, and months later becomes embroiled as her husband, a martial arts expert, finds himself fighting a Visitor plot to brainwash his colleagues around the world. There's some beautifully imagined sidelights of a planetary takeover by homophages, and the story is nicely complicated by Visitor politics. But the story is also seriously constrained by the need to leave room for sequels ad libitum. Fun, yes. But don't be misled by Som-

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tow's name on the cover. You'll get a much better buy with one of his other, more ambitious books.

It's been awhile since one of Mike Resnick's Tales of the Velvet Comet, that palatial whorehouse in the sky of Deluros VIII, and the last one I did pan at least a little. But now we have **Eros Descending,** and I call it the best in the series so far. When I told him so, he answered by dedicating the book, in part, to me, "for criticism and encouragement."

The title is peculiarly apt. *Eros Ascending* saw the Velvet Comet inaugurate a new age of decadence. *Eros at Zenith* saw it at its peak of luxuriant sinfulness. Now *Eros Descending* shows us the high-flying bordello's last days, under violent attack by the Jesus Pures, fundamentalist Christians, and its actual closing.

But that is not really the story. Mike is, for all I know, a highly moral man, but he admires extravagant sinning, perhaps especially where it involves sex. And I suspect he does *not* admire the religiously intolerant. Thus he gives us a mortal heaven and then takes it away from us in such a way that we can only say he must see the Velvet Comet's death as a fall from grace. He does this trick by focusing his story on the leader of the Jesus Pures, Thomas Gold, who first comes to the Comet to preside over a charitable horse race, featuring genetic reconstructions of Secretariat and Seattle Slew. There Gold first meets two alien employees of the Comet's brothel who bear an arousing resemblance to the most enticing of pubescent humans. He is outraged, of course, but he is also obsessed. When church members steal and convey to him tapes of the aliens' training, the obsession deepens. In the end, he too falls from grace, and the reader's sympathy shifts from the Comet to its attacker. Call it bathos if you like, but call it effective too. Resnick magnificently highlights the ambiguity of morality, and even the pain of free will.

For completists—is there anyone collecting Resnick's work?—let me note very briefly **The Inn of the Hairy Toad,** a novelette published as a pamphlet for Delta Con (No. 1 Finch St., New Orleans, LA 70124). It is a fairly heavy-handed parody of heroic fantasy featuring Cretin the Beggar, Krotan the Conqueror, Pierpont the wizard, and Steeljaw the Djinn. Minor, fannish stuff.

R.A. MacAvoy gave herself a tough act to follow with the *Damiano* trilogy; and though her latest, **The Book of Kells,** lacks the drama of opposing angels, it is in many ways just as enchanting, just as marvelous, just as grand a read. MacAvoy obtained much of the background material from Sharon Devlin, "a noted scholar and performer of early Irish music," and she refers to the book's authors as "we," as does Ms. Devlin in her "Afterword."

The tale begins when John Thornburn, itinerant and ineffectual artist of design, traces the endlessly interlocking circles of a rubbing he has made of a stone cross from the ancient days of Eire. The power of the design combines with that of a recording of Irish music to open a gateway to the Ireland of about 975 A.D. Through the gate flies a nude woman, Ailesh, young, bloody, and lovely. John cannot cope, so he summons his patron and sometime lover, Irish scholar and Gaelic speaker Derval O'Keane, for help. The result is that he reopens the gate, and all three go through, to find a scene of devastation:

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Vikings have attacked Ailesh's home and slaughtered all.

And the tale is off. Our trio, with a badly wounded poet in tow, head for Dublin to call the king's debt to his dead subjects. They meet Saint Bridget, wet-nurse of Jesus, Christianized god of the Irish, who heals their wounds. They find a recalcitrant king, a loyal Icelander, quarreling saracens, and an abbey where John gets his chance to hold and admire the Book of Kells. And then the Vikings catch up with them, avid for their blood for they had escaped the reivers' vow to slay all as sacrifices to Odin.

There is love and violence, local color, and a vision of divinity that fits nicely with what we saw in *Damiano*. There is too one feature that I think may be MacAvoy's hallmark: a love of her characters, of ordinary people in extraordinary circumstances, even of her villains, that gently illuminates a world-scape we might all wish to live in, whatever our stations, whatever our ultimate fates.

The book begs for readers. Please don't disappoint it.

The third in C. J. Cherryh's series of tales of alien space occupied by the assorted species of feline hani, weaselish kif, otterish mohendo'sat, and others, all stirred by human intrusion, as personified by the hapless Tully, is now here. It's **The Kif Strike Back,** and I found it rather more appealing that volume two *(Chanur's Venture)*. The aliens seem more alien, once again, and their machinations have a realistic feel, though they are so convoluted they are sometimes hard to follow. At the end of the last book, we left Tully and hani Hilfy in the hands of the kif, expecting rescue. Here we see the rescue, as Pyanfar Chanur, captain of the trading vessel *Pride of Chanur*, faces down the kif chieftain and gains their release. Yet there is a price—too-deep involvement in interspecies intrigue—as the kif Sikkukkut maneuvers to dominate his civilization, the Mohendo'sats Goldtooth and Jik seek to neutralize kif threats to their trading empire by suporting Sikkukkut against his rival Akkhtimakt, and the hani cop Rhif Ehrran tries to pin the crime of excessive independence on the Chanur clan.

And the humans are coming. A fleet is on its way from Earth, seeking trade contacts to build a network that can stand against two existing and competing human networks, perhaps the two we know from Cherryh's other books. We glimpse them only as rumors, but we feel that they are getting closer and in the next book, *Chanur's Homecoming*, we seem bound to meet Tully's fellows at last.

It is interesting to note that Cherryh here seems to be developing this series as a way of showing how interspecies rivalries might be turned to alliances. From the beginning, we have seen a human, Tully, becoming part of a ship's crew, developing loyalties that transcend the bounds of species. Now *Pride of Chanur* acquires a kif as a gift from Sikkukkut, and we see develop this kif's sense of belonging with the hani, as well as hani acceptance of a stinking, treacherous kif. Too, Chanur rescues the crew of the pirate ship *Moon Rising*, belonging to a very different hani clan. Cherryh seeks a *modus vivendi* based on shared intelligence and interest rather than shared blood, and such ways of life will be essential if we are ever to build or partake of an interstellar civilization.

I seem to recall reading somewhere that Rudy Rucker was about to publish an autobiographical novel. If so, **The Secret of Life** may be it, at least in part.

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In it, Rucker gives us a young man growing up in the sixties in Louisville. Conrad Bunger is an existentialist misfit who, even in high school, is too fond of booze. His principles are a mite loose, too, for he has no qualms about stealing the church's communion wine. And he fantasizes about being a foundling left on Earth by saucerites, probably the same ones whose craft a neighboring farmer swears he saw on Conrad's tenth birthday. He feeds his fantasy with the sureness that he can recall nothing before that day. Were his family's and neighbors' memories tampered with? He feeds it still more with the conviction that he can fly. Didn't he lift a full inch off his seat the day he kissed Dee?

And then, walking on a railroad trestle when a train come by, he really does fly. In college, at Swarthmore, he does it again, and again when he lifts his girlfriend off the Eiffel Tower in Paris. But then his feat makes the paper and, exposed, he loses the power, only to gain a new one—now he can shrink to escape danger.

Yes, it's true. He really is an alien in disguise. He believes he is on Earth in order to discover what humans think is the secret of life. If he finds an answer, it is far simpler than he had expected, but that turns out to be all right. His mission isn't what he thought either. After misadventures galore, some of them hilarious, he emerges from chaos as just another Joe, human and happy to be human, with a normal life ahead of him.

So—Is Rudy Rucker an alien in disguise? He seems to be saying that he once felt that way but that he has learned to fit into his environment, to blend and be satisfied, and that *that* is the secret of life. Then again, anyone who can write the kinds of stories Rucker is so deft at composing, all infinities and mind-warps, just may really be an alien in disguise. The secret of his success would then be having found that very special environment—SF—in which no one notices.

But seriously, with *The Secret of Life* Rucker makes a bid to be the J. D. Salinger of the 1980s. His meat, as in *Catcher in the Rye*, is the pain of growing up, of coming to terms with reality, of fitting in. And he handles it well, in the process showing those of us who need showing that SF has all the potential of the mainstream, and is besides better suited to modern times.

Needing only brief remark is Algis Budrys' **Benchmarks: Galaxy Bookshelf,** which reprints an honored colleague's book review columns from a now-defunct magazine. The collection comes complete with an introduction by scholar Catherine L. McClenahan, a reminiscence by Fred Pohl, a "Foreward" by Budrys himself, and a sheaf of footnotes and interpolated comments.

Between 1965 and 1971, Budrys established a reputation for wit and bite, often highly caustic and generally fully appropriate. In recent years, he has been carrying on his mission in the pages of *The Magazine of Fantasy and Science Fiction*, and he may one day attain a second collection of columns. For now—since you would never read a competing magazine, would you?—ask your local library to get this one, and be the first on your block to check it out. Bear in mind that Budrys is one of my own favorite reviewers, even if I don't always agree with him. Too, I sometimes take him as my model. ■

● Fools rush in where fools have been before.
Jerry Buchmeyer

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brass tacks

Dear Dr. Schmidt:

We noted with dismay "Astronomical Ghost Towns" in the March 1985 *Analog*, not because there is no room for disagreement over the future of observational astronomy, but because the writer simply did not do his homework, and the piece abounds with technical inaccuracies.

It should be made clear to your readers, for example, that astronomers welcome (and none we know of "fear") the advent of the Space Telescope, which we expect to extend human vision significantly further into time and space. However, there will still be things—high-resolution spectroscopy, for example—that can be done better from large groundbased telescopes. We view the two systems as complementary, each doing what it does best. The Space Telescope will tell us something is there; the large groundbased telescopes will tell us what that something is.

The design of the National New Technology Telescope (NNTT is calculated to destroy the conventional cost equation described in the article, in which telescope cost varies almost as the cube of mirror diameter. New mirror-building technology is permitting us to do that. Our preliminary estimates for building the NNTT indicate the $2 billion figure used in the article is too much by at least a factor of 10.

Finally, the idea that city lights are destroying groundbased astronomy would startle the many communities that, having learned from the Mount Wilson experience, are doing everything they can to reduce light pollution. Because of such cooperation, we expect Kitt Peak to be a viable observatory well into the next century. The NNTT, planned for an optimum site either in the continental U.S. or Hawaii, will be the large telescope of the 21st century.

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The "astronomical ghost towns," if they come at all, will come long after all of us now here are gone. In the meantime, the complementary space Telescope, NNTT, and other great groundbased telescopes will have done for our understanding of the evolution and fate of the universe what the 200-inch telescope at Palomar did for our understanding of galaxies.

CARL A. POSEY
Public Information Officer
National Optical
Astronomy Observatories

The author replies . . .

I was surprised to see Carl A. Posey's letter criticizing my *Alternate View* column entitled "Astronomical Ghost Towns."

I obtained my data from three sources: (a) Carl A. Posey's own press releases on the NNTT and on Kitt Peak in general, (b) NASA press releases and publications concerning the Hubble Space Telescope, and (c) *Science News* magazine. I did my homework. Most of my data came directly from my critic!

I suspect that Carl has now removed me from his press release mailing list. . . .

I often wish that the readers of "The Alternate View" would read it as carefully as I read the background and research material I use in writing it.

G. HARRY STINE

Dear Mr. Schmidt:

In the March *Analog* you said that some of your editorials were just presented for argument and did not represent your actual beliefs. I hope that "Speak for Yourself," in the April issue, is one of this type. In it, you advocate banning political advertisements and permitting candidates a strictly limited forum to present their platforms, in order to avoid media campaigns. This proposal is unlikely to solve the problems it is designed to solve, and will only spawn more bureaucracy and stifle political debate.

Just how do you intend your rules to be enforced? You say that each candidate would have "strictly limited column space in newspapers." So what happens if a newspaper prints too much about a candidate? Should the editor, or the candidate, be imprisoned? If this happens, the First Amendment might as well be consigned to the paper shredder. In fact, any limitations on what anybody can say or print would seem to be a violation of the most basic freedoms, Freedom of Speech and Press. These freedoms were certainly not intended to exclude political statements; in fact, political speech is the primary thing that was supposed to be protected from government control by this amendment.

You say that your proposed rule would eliminate the advantage which candidates with a lot of money have over other, lesser-funded candidates. This is unlikely to prove true in practice. There will inevitably be loopholes which can be exploited by the candidates. For example, what about commercials which highlight a specific viewpoint associated in the public's mind with one candidate (such as tax and budget cuts for Reagan, or a nuclear freeze for Mondale), but which don't actually mention the candidate's name? If these were banned under your law, then nobody would be able to publish a political opinion without fearing the Feds' busting him for violation of the law; while if they were permitted they would be exploited to the utmost by candidates.

Meanwhile, the small candidates, the supposed beneficiaries of your law, would be saddled with all sorts of burdensome restrictions and reporting requirements, putting them at a clear

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disadvantage in opposition to better-funded candidates who can afford to hire teams of lawyers and accountants to keep track of this sort of thing and advise them on what they can legally do. This has been precisely the effect of campaign spending restrictions which were enacted for pretty much the same reasons as your proposal. I have been involved with Libertarian Party campaigns, and I know that all the campaign expense limits and reporting requirements are a major nuisance which hinders their fundraising and campaign efforts, despite the fact that, compared to the Republicans and Democrats, they are clearly among the "little guys" whom these laws were supposed to benefit.

In addition, once your proposal is adopted, why stop at political advertising? Don't large corporations have an "unfair" advantage in being able to launch massive national ad campaigns for their products while smaller businesses may have better quality products but not have the budget to run as many ads? Thus, under the logic of your proposal, there would be justification for banning advertising entirely, and creating a Federal Product Information Agency to provide descriptions of products to the public. This would of course result in a severe limitation of the free market, an expansion of the government's size, power, and cost, and a limitation on freedom of speech.

In closing, your proposal, like your earlier one regarding inheritances, is superficially a step toward equalizing opportunity, but in actuality would only lead to increasing government control of our lives. And your current proposal is particularly dangerous, since it involves a government restriction on what sort of information may be conveyed to the public, which is a serious violation of the First Amendment.

DANIEL J. TOBIAS

Pittsburgh, PA

No, this proposal (made in the same spirit as the earlier one) does not *"involve a government restriction on what sort of information may be conveyed . . ."; a candidate could say absolutely anything he wanted, the only requirement being that he must do it* himself *in a given amount of time and space. Nor did the proposal say anything about what an editor or newspaper could say* about *a candidate, "by" is not the same as "about." Sure, there would be problems with implementing it—but there'd be plenty of real ones without inventing extras.*

Dr. Schmidt:

A memory leapt into my mind. I suspect it was prompted by the juxtaposition of your editorial "Speak For Yourself," the short story "Thy Neighbor's Assets" by Kevin O'Donnell, Jr., the letter from R. S. Potts in the April 1985 *Analog*, and your response to that letter.

As I read your response, I recalled an alternative approach to American "traditional" voting methods which was presented by Nevil Shute (Norway) in his novel "In the Wet." He described a concept of weighted votes based on the experience of the individual. Each citizen above voting age was granted the basic vote. Six circumstances would increase the weight of a person's vote:

1. higher education (a university degree or equivalent special training, such as a military commission)
2. family (raising two children to the age of fourteen without getting a divorce)
3. achievement in business (earned income above a set level)

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4. travel (earning your living outside the country for at least two years)
5. church service (an official of a recognized church)
6. service to the country (granted by the country's leader for exceptional service)

The concept is thought provoking, although alien to the American tradition of "one individual, one vote."

I agree with you that there are always alternatives. Weighing them objectively may be very difficult due to our mind sets.

To anyone who cannot find ANY viable alternatives to our present methods, I say that a change may be good, or a change may be bad, but a society's failure to adapt is historically fatal.

D. J. ELDEN

Santa Barbara, CA

Dear Stan:

Once again, you've struck a nerve. Your point in the May editorial is accurate, but incomplete. Not only does Garbage In produce Garbage Out (GIGO—pronounced GEEG-oh), but Good Information In can produce Garbage Out (GII-go—pronounced GEE-2-go). How? Simply by exceeding the limits of your tools.

The day after I received my May *Analog*, I got a letter from a reader in Saudi Arabia. He was trying to use an equation in my book on home satellite television and he complained that according to his computer, the equation was "mathematically impossible" for the necessary values.

I won't reproduce the equation here, but essentially what he was doing was dividing one very large number by another large number, subtracting the result from 90 degrees, and taking the arc cosine.

What had happened, of course, was that in the process of representing the numerator and denominator in floating point arithmetic the computer had lopped enough significant figures off the end of each to make the quotient come out zero. That left the computer trying to take the arc cosine of 90 degrees—which is an undefined operation. Because the computer had given him an error message, he assumed there had to be something wrong with either the equation or the process. It never occured to him that he might have exceeded the limits of his tool.

I showed the letter to a friend of mine and he wasn't at all surprised. He told me that a university psychology department recently did an experiment which involved giving a gimmicked calculator to an engineering student and asking him to solve a series of math problems. The calculator could be set to produce errors in any significant figure and the experimenters wanted to see how large the error would have to be before the test subjects realized there was something wrong.

I guess you'd have to rate the experiment a failure. According to my friend, the students never did realize what was going on. No matter how great the error, the students continued to rely blindly on the calculator.

What seems to be happening here is that a great many people no longer understand one of the most fundamental rules for any tool-making species. Namely, that any tool has its limits and cannot be relied upon outside those limits. We appear to have created a class of tools which has us so mesmerized that we have trouble realizing they even have limits—much less considering those limits when evaluating the tools' operations.

This does not just apply to computers and calculators. Models of various sorts

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are also tools and like any tool they have limits. In the last 10 or 15 years we have seen a lot of misuse of models by people who didn't understand this.

In your editorial, you mentioned the Club of Rome report, "Limits to Growth." In retrospect it is obvious that the report's conclusions were based on a hopelessly flawed model. To take one simple example, the model completely ignored resource prices. It assumed that the scarcity function would adequately reflect conditions as resources were consumed.

The terrible irony of this approach was that even as "Limits" was becoming the doom-and-gloomers' equivalent of the hard-shell Baptist preacher's Bible, world events were showing just how completely inadequate that assumption was. Oil price shock, the major economic convulsion of the 1970s, owed almost nothing to resource scarcity. It was the result of cartel action by the producers. If anyone had cared to look, they would have seen that this kind of artifical price inflation characterizes any resource as it approaches the point of scarcity. Even before a resource becomes truly scarce, the price is probably going to rise steeply. Of course, as the price rises, substitutes become more attractive, conservation sets in, and demand declines. That is why most commodities never become scarce in the "Limits to Growth" sense.

A more immediate example is the Net Present Value (NPV) method of evaluating a project. If you have had to sell a long-term project to a modern corporation, or if you read reports from the Office of Technology Assessment or many of the antigrowth groups, you are probably all too familiar with NPV.

The basic idea behind NPV is that money has value in time. A dollar one year from now is worth less than a dollar today. The difference in value between future dollars and present ones is expressed in terms of a discount rate. By figuring the income and expenditures from a project for each year of its life and discounting them back to the present, you come up with a dollar value representing the worth of the project.

This is a very useful tool for short-range budgeting—say five years or less. When it is applied to a long-term project it has all the charm and efficacy of perfumed nerve gas.

The problem comes when you try to apply this technique to something like a space station, or an L5 colony or any other endeavor which will stretch over a decade or more and cost a lot of money. It turns out that if you use any "reasonable" discount rate—such as the amount the same money could earn invested in bonds—these projects are uneconomical. Anything that costs a lot of money up front and won't show a positive cash flow for a couple of decades has to have a truly awesome payback to be economical under the NPV model.

The central difficulty in long-range NPV calculations is that the method is built on predicting the future. In the short run you can usually do this well enough to make the method work. That is, you can estimate fairly closely what the income and expense flows of the project will be and either ignore changes in the world outside the model or treat them with some fairly simple assumptions.

In the long run that simply doesn't work. The world around you is likely to change in ways that knock your assumptions into a cocked hat. The changes may be either positive or negative, but given a long enough time frame the model is guaranteed to fail.

I used to work for a utility company,

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and as part of my job I had the opportunity to read some of their old planning documents. When a nuclear power plant was planned in the early 1970s, the company had assumed an average interest rate of 8 percent over the life of the project. This was higher than the current rate for utility bonds and much higher than the company's historical interest rate on bonds. The last I heard, the company was paying 12 to 14 percent for their money and the cost of the plant had nearly doubled.

On the other hand, back in the 1960s, the company had decided to build coal-fired plants over considerable internal opposition. According to the NPV studies, the life cycle cost of building plants burning natural gas would be much lower. For a number of reasons, the company went ahead with the coal plants and reaped the benefits a decade later when the price of gas skyrocketed.

Understand, the NPV method is not faulty. Neither, necessarily, was the Club of Rome model. But they have limits and when pushed beyond their limits of precision they will give erroneous answers. GIIGO.

To me, one of the most interesting things about this phenomenon is that the people who really understand these models are often perfectly aware of their limits and, indeed, warn against their abuse.

In the case of the Club of Rome model, Jay Forrester, the man who was responsible for it, readily admitted that it was not accurate. He had originally set it up as an exercise in developing large models, not for its predictive value. His response to the people who questioned it was to challenge the critics to come up with better models.

I think much more kindly of the NPV method since I interviewed a former consultant for Arthur Anderson who understood how it works. He pointed out that the model is designed to allow for the possibility for unforseen events, both good and bad, by adjusting the discount rate. On a project with a lot of uncertainty the discount rate is never something as simple as the interest on a safe investment. Even if major benefits cannot be quantified—as is the case with something like a space station or L5 colony—they can be allowed for by adjusting the discount rate. Needless to say, this somehow escapes the people who are interested in using NPV to show that such projects are uneconomic.

Treating tools like this, whether models or computers, is clearly not rational. The reason we do it, I suspect, is the same reason that the Greeks went to Delphi. What we want is an oracle—a guide for future action in future-shocked times. Our ancestors went to Delphi, or read tarot cards. We consult our calculators, computers, and models.

Unfortunately, there is a major difference between the NPV model or a computer and reading Tarot cards. The Tarot, I Ching and such—properly used—only serve to focus the user's attention on the psychological dimensions of the problem. Their ambiguity forces the user to stop trying to reconcile the unreconcilable and to look at which of the identified outcomes is likely to be most satisfying. This isn't magic, but it can be excellent psychology. (See Steve Levy's column in the April, 1985 issue of *Popular Computing* for an example of the technique in action.)

Using a mathematical model in place of an oracle in effect substitutes Calvinist determinism for Taoist fluidity. In their ambiguity, the oracles of the tarot or Delphi left us with the illusion of free will. In their rigidity, the oracles of the computer and mathematical model leave us with the illusion of predestination. Both are illusions, but the illusions of the modern oracle are much more dangerous.

RICK COOK ■

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a calendar of analog upcoming events

29 November-1 December
LOSCON 12 (Los Angeles area SF conference) at the Pasadena Hilton, Pasadena, Calif. Guest of Honor—Robert Silverberg, Guest of Honor in Absentia—Daniel Manus Pinkwater, Fan Guest of Honor—Terry Carr. Registration—$17.50 until 1 November, $20 at the door. Info: LOSCON 12, % LASFS, 11513 Burbank Blvd., North Hollywood CA 91601.

2-5 December
IEEE Global Telecommunications Conference at New Orleans, La. Info: D.P. Dodd, Bell South Services, Box C360, fourth floor, Birmingham AL 35283. (205) 321-3723.

6-8 December
TROPICON IV (Florida SF conference) at Holiday Inn, Ft. Lauderdale, Fla. Guest of Honor—Robert Bloch. Registration—$10 until 1 November, $15 thereafter. Info: Tropicon % Joe Siclari, 4599 NW 5th Street, Boca Raton FL 33431.

11-13 December
Second Conference on Artificial Intelligent Applications (IEEE) at Miami Beach, Fla. Info: Artificial Intelligence Conference, Box 639, Silver Spring MD 20901.

16-20 December
First International Conference on Supercomputing Systems (IEEE) at Tarpon Springs, Fla. Info: Artificial Intelligence Conference, Box 639, Silver Springs MD 20901.

27-29 December
EVECON at Washington, D.C. Registration—$10 in advance, $15 at the door. Info: FanTek, Box 128, Aberdeen MD 21001.

28 August-1 September 1986
CONFEDERATION (44th World Science Fiction Convention) at Atlanta, Georgia. Guest of Honor—Ray Bradbury, Fan Guest of Honor—Terry Carr, TM—Bob Shaw Registration—$25 supporting; $45 until 1 August 1985. This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition, the works. Join now and get to nominate and vote for the Hugo awards and the John W. Campbell Award for Best New Writer. Info: ConFederation, 2500 North Atlanta Street #1986, Smyrna GA 30080. (404) 438-3943.

—Anthony Lewis

Items for the Calendar should be sent to the Editorial Offices six months in advance of the event.

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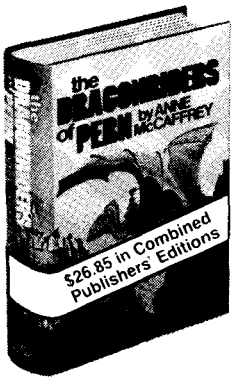

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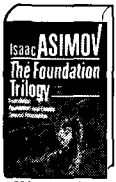

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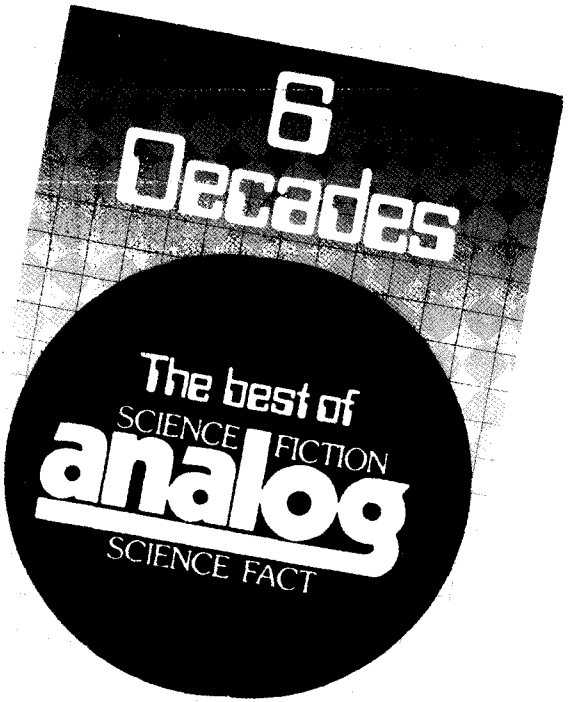

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